MSI
MICRO-STAR INTERNATIONAL

G31M3 series

MS-7528 (v1.X) Mainboard

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Revision History

Revision	Revision History	Date
V1.0	First release	January 2008

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

    Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: ***http://global.msi.com.tw/index.php?func=faqIndex***

    Contact our technical staff at: ***http://support.msi.com.tw/***

Safety Instructions

1. Always read the safety instructions carefully.

2. Keep this User's Manual for future reference.

3. Keep this equipment away from humidity.

4. Lay this equipment on a reliable flat surface before setting it up.

5. The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.

6. Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.

7. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.

8. Always Unplug the Power Cord before inserting any add-on card or module.

9. All cautions and warnings on the equipment should be noted.

10. Never pour any liquid into the opening that could damage or cause electrical shock.

11. If any of the following situations arises, get the equipment checked by a service personnel:

    † The power cord or plug is damaged.
    † Liquid has penetrated into the equipment.
    † The equipment has been exposed to moisture.
    † The equipment has not work well or you can not get it work according to User's Manual.
    † The equipment has dropped and damaged.
    † The equipment has obvious sign of breakage.

12. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60^0 C (140^0F), IT MAY DAMAGE THE EQUIPMENT.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

警告使用者:
這是甲類的資訊產品,在居住的環境中使用時,可能會造成無線電干擾,
在這種情況下,使用者會被要求採取某些適當的對策。

廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed below.

>   † Reorient or relocate the receiving antenna.

>   † Increase the separation between the equipment and receiver.

>   † Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

>   † Consult the dealer or an experienced radio/television technician for help.

Notice 1
The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2
Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

**Micro-Star International
MS-7528**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

WEEE (Waste Electrical and Electronic Equipment) Statement

ENGLISH

To protect the global environment and as an environmentalist, MSI must remind you that...

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

DEUTSCH

Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.

ESPAÑOL

MSI como empresa comprometida con la protección del medio ambiente, recomienda:

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.

NEDERLANDS

Om het milieu te beschermen, wil MSI u eraan herinneren dat....

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling.

Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.

SRPSKI

Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da...

Po Direktivi Evropske unije ("EU") o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.

POLSKI

Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...

Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne " nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.

TÜRKÇE

Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:

Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.

ČESKY

Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...

Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.

MAGYAR

Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...

Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.

ITALIANO

Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che....

In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta.

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Chapter 1
Getting Started

Thank you for choosing the G31M3 Series (MS-7528 v1.X) Micro-ATX mainboard. The G31M3 Series mainboards are based on **Intel® G31 & ICH7/ICH7R** chipsets for optimal system efficiency. Designed to fit the advanced **Intel® Core 2 Duo/Quad/Pentium/Celeron LGA775** processor, the G31M3 Series deliver a high performance and professional desktop platform solution.

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Mainboard Specifications

Processor Support

- Intel® Core™2 Duo/ Core™2 Quad/Pentium Dual-Core E2XXX and Celeron 400 LGA775 processors in LGA775 package.
- Supports 4 pin CPU Fan Pin-Header with Fan Speed Control.
(For the latest information about CPU, please visit http://global.msi.com.tw/index.php?func=cpuform)

Supported FSB

- 800/1066/1333 MHz

Chipset

- North Bridge: Intel® G31 chipset
- South Bridge: Intel® ICH7/ ICH7R(optional) chipset

Memory Support

- DDR2 667/800 SDRAM (4GB Max)
- 2 DDR2 DIMMs (240pin / 1.8V)
(For more information on compatible components, please visit http://global.msi.com.tw/index.php?func=testreport)

LAN (Optional)

- Supports Realtek® RTL8111C 10/100/1000 Mb/s
- Supports Realtek® RTL8101E 10/100 Mb/s (optional)
- Compliance with PCI 2.2
- Supports ACPI Power Management

Audio

- Chip integrated by Realtek® ALC888
- Flexible 8-channel audio with jack sensing

To reach the 8-channel sound effect, the 7th and 8th channels must to output from front panel (pinheader) if you purchase the mainboard with 3 audio jacks.

IEEE 1394 (optional)

- Chip integrated by JMicron 381
- Transfer rate is up to 400Mbps

IDE

- 1 IDE port by ICH7/ICH7R
- Supports Ultra DMA 66/100 mode
- Supports PIO, Bus Master operation mode

SATA

- SATA II ports by ICH7/ICH7R (optional)
- Supports four SATA II devices
- Supports storage and data transfers at up to 300MB/s
- Supports RAID 0/1/0+1 (for ICH7R only)

Floppy
- 1 floppy port
- Supports 1 FDD with 360KB, 720KB, 1.2MB, 1.44MB and 2.88MB

Connectors

● **Back panel**
- 1 PS/2 mouse port
- 1 PS/2 keyboard port
- 1 serial port (COM1)
- 1 VGA port
- 1 parallel port supporting SPP/EPP/ECP mode
- 4 USB 2.0 Ports
- 1 RJ-45 LAN Jack
- 1 1394 port (optional)
- 6 flexible audio jacks/ 3 flexible audio jacks (optional)

● **On-Board Pinheaders/ Connectors**
- 2 USB 2.0 pinheaders
- 1 CD-in pinheader
- 1 SPDIF-Out pinheader
- 1 IEEE 1394 pinheader (optional)
- 1 Front Panel Audio pinheader
- 1 serial port pinheader
- 1 TPM (optional)
- 1 Chassis Intrusion Switch pinheader

Slots
- 1 PCI Express x16 slot
- 1 PCI Express x 1 slot
- 2 PCI slots
- Support 3.3V/ 5V PCI bus Interface

Form Factor
- Micro-ATX (24.4cm X 21.8cm)

Mounting
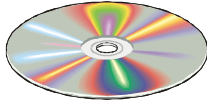- 6 mounting holes

Mainboard Layout
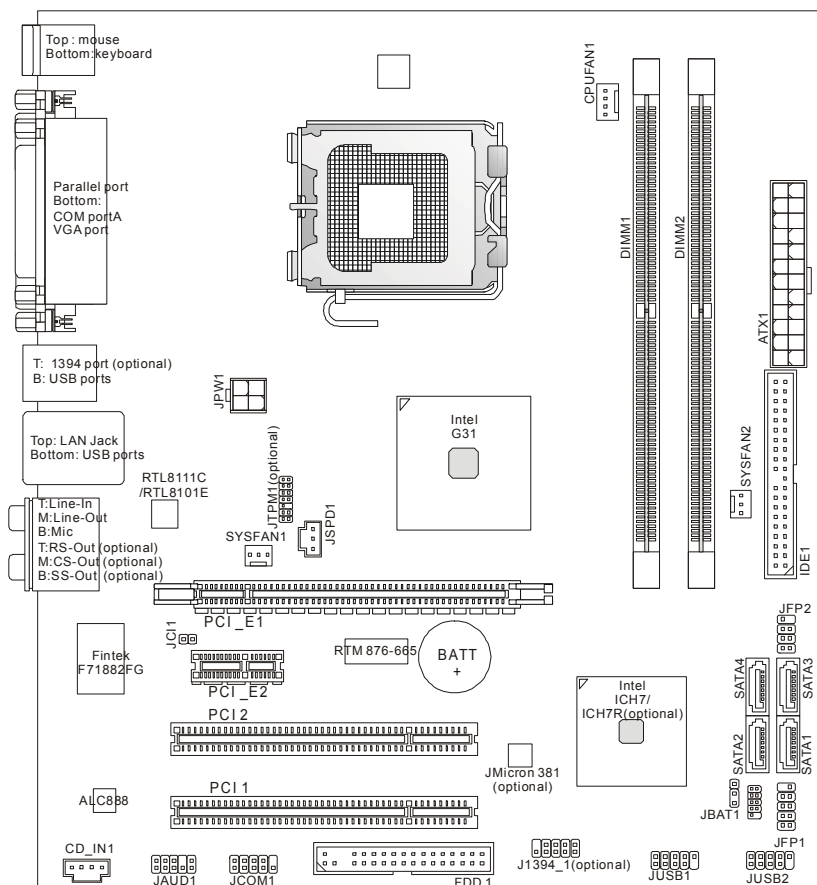
**G31M3 Series
(MS-7528 v1.X) Micro-ATX Mainboard**

Packing Checklist

MSI motherboard

MSI Driver/Utility CD

SATA Cable

Power Cable

Standard Cable for IDE Devices

Back IO Shield

User's Guide

* The pictures are for reference only and may vary from the packing contents of the product you purchased.
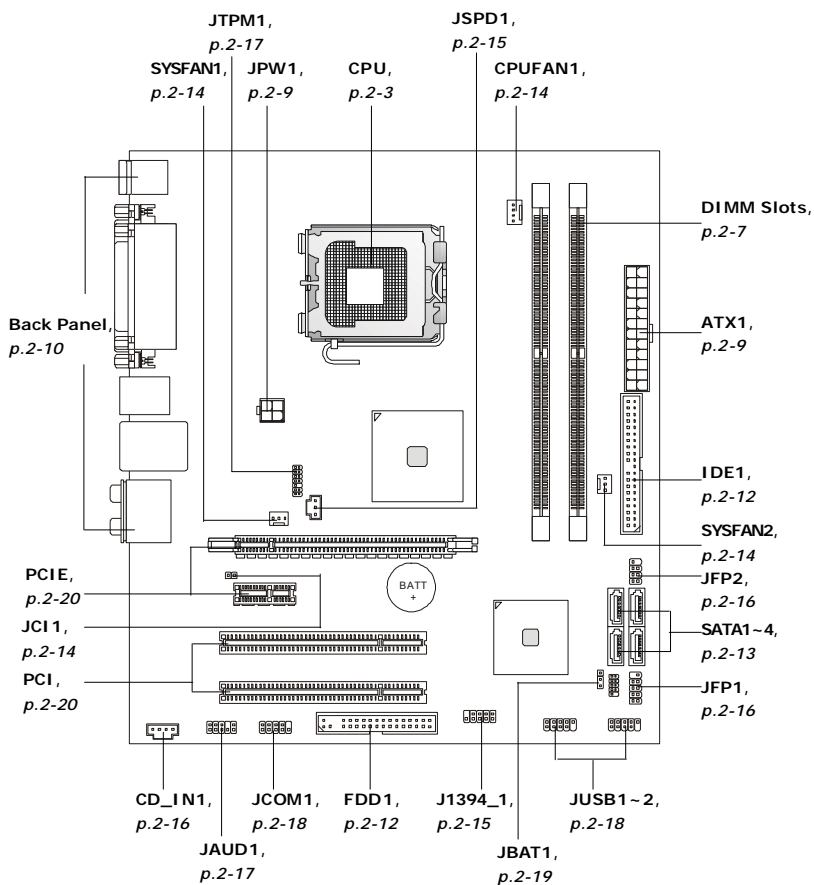
Chapter 2
Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

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CPU (Central Processing Unit)

When you are installing the CPU, **make sure to install the cooler to prevent overheating.** If you do not have the CPU cooler, consult your dealer before turning on the computer.

For the latest information about CPU, please visit *http://global.msi.com.tw/index.php?func=cpuform*

Important

Overheating
Overheating will seriously damage the CPU and system. Always make sure the cooling fan can work properly to protect the CPU from overheating. Make sure that you apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.

Replaceing the CPU
While replacing the CPU, always turn off the ATX power supply or unplug the power supply's power cord from the grounded outlet first to ensure the safety of CPU.

Overclocking
*This mainboard is designed to support overclocking. However, please make sure your components are able to tolerate such abnormal setting, while doing overclocking. Any attempt to operate beyond product specifications is not recommended. **We do not guarantee the damages or risks caused by inadequate operation or beyond product specifications.***
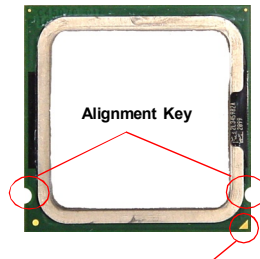
Introduction to LGA 775 CPU

The pin-pad side of LGA 775 CPU.
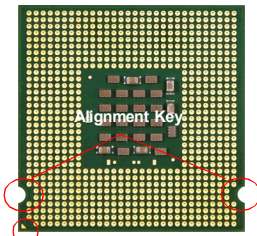
The surface of LGA 775 CPU. Remember to apply some thermal paste on it for better heat dispersion.

Alignment Key

Yellow triangle is the Pin 1 indicator

Alignment Key

Yellow triangle is the Pin 1 indicator

CPU & Cooler Installation

When you are installing the CPU, **make sure the CPU has a cooler attached on the top to prevent overheating.** Meanwhile, do not forget to apply some thermal paste on CPU before installing the heat sink/cooler fan for better heat dispersion. Follow the steps below to install the CPU & cooler correctly. Wrong installation will cause the damage of your CPU & mainboard.

1. The CPU socket has a plastic cap on it to protect the contact from damage. Before you install the CPU, always cover it to protect the socket pin.

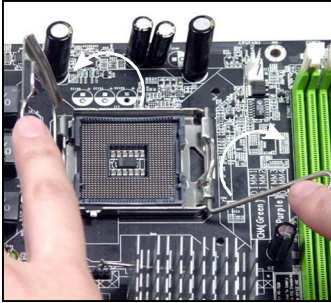2. Remove the cap from lever hinge side (as the arrow shows).
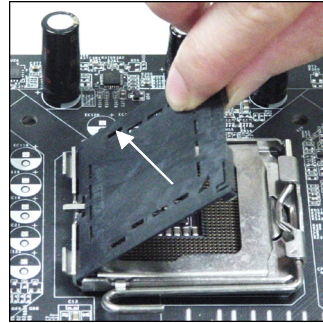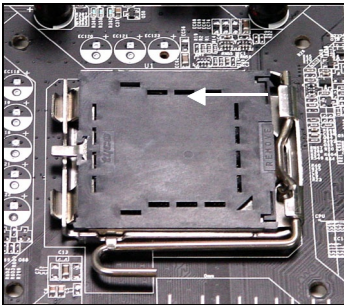
3. The pins of socket reveal.

4. Open the load lever.
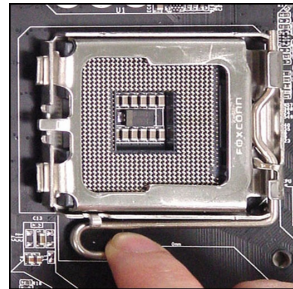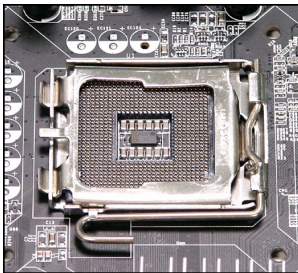
Important

1. Confirm if your CPU cooler is firmly installed before turning on your system.
2. Do not touch the CPU socket pins to avoid damaging.
*3. The availability of the CPU land side cover depends on your CPU packing.*

5. Lift the load lever up and open the load plate.

6. After confirming the CPU direction for correct mating, put down the CPU in the socket housing frame. Be sure to grasp on the edge of the CPU base. Note that the alignment keys are matched.

alignment key
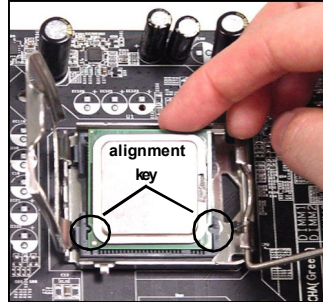
7. Visually inspect if the CPU is seated well into the socket. If not, take out the CPU with pure vertical motion and reinstall.
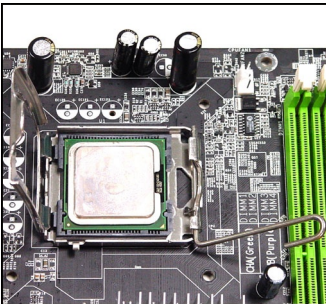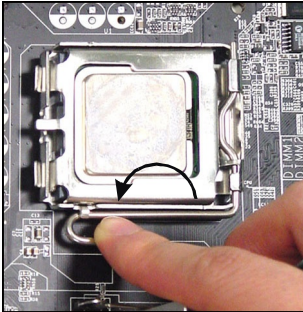
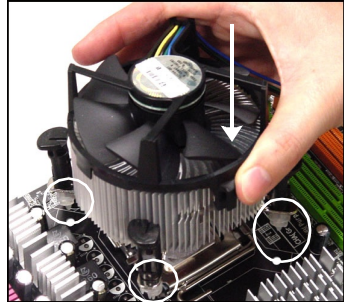8. Cover the load plate onto the package.
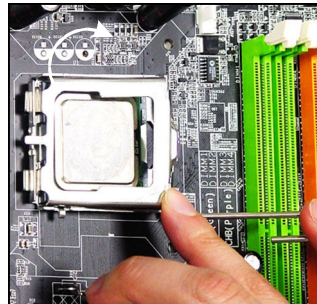
9. Press down the load lever lightly onto the load plate, and then secure the lever with the hook under retention tab.

10. Align the holes on the mainboard with the heatsink. Push down the cooler until its four clips get wedged into the holes of the mainboard.

11. Press the four hooks down to fasten the cooler. Then rotate the locking switch (refer to the correct direction marked on it) to lock the hooks.
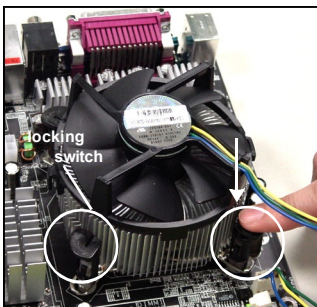
12. Turn over the mainboard to confirm that the clip-ends are correctly inserted.

locking switch
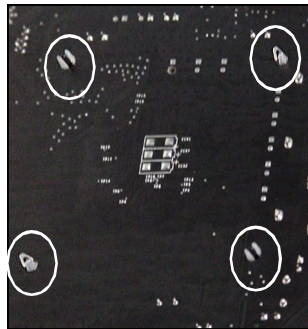
Important

1. Read the CPU status in BIOS (Chapter 3).
2. Whenever CPU is not installed, always protect your CPU socket pin with the plastic cap covered (shown in Figure 1) to avoid damaging.
3. Mainboard photos shown in this section are for demonstration of the CPU/ cooler installation only. The appearance of your mainboard may vary depending on the model you purchase.

Memory

These DIMM slots are used for installing memory modules.
For more information on compatible components, please visit *http://global.msi.com.tw/index.php?func=testreport*

DDR2
240-pin, 1.8V

56x2=112 pin   64x2=128 pin
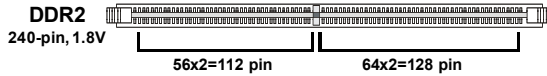
Dual-Channel Memory Population Rules

In Dual-Channel mode, the memory modules can transmit and receive data with two data bus lines simultaneously. Enabling Dual-Channel mode can enhance the system performance. Please refer to the following illustrations for population rules under Dual-Channel mode.

1   DIMM1
              DIMM2

              Installed
              Empty
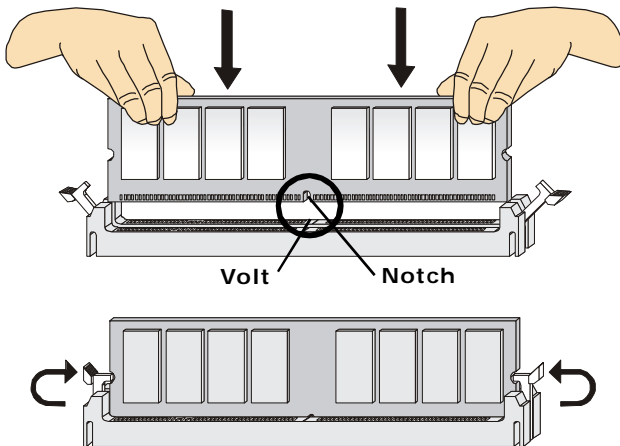
Installing Memory Modules

1. The memory module has only one notch on the center and will only fit in the right orientation.

2. Insert the memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the DIMM slot.

Important

You can barely see the golden finger if the memory module is properly inserted in the DIMM slot.

3. The plastic clip at each side of the DIMM slot will automatically close.

Volt   **Notch**

Important

- *DDR2 memory modules are not interchangeable with DDR and the DDR2 standard is not backwards compatible. You should always install DDR2 memory modules in the DDR2 DIMM slots.*
- *In Dual-Channel mode, make sure that you install memory modules of **the same type and density** in different channel DIMM slots.*
- *To enable successful system boot-up, always insert the memory modules into the **DIMM1 first.***

Power Supply

ATX 24-Pin Power Connector: ATX1

This connector allows you to connect an ATX 24-pin power supply. To connect the ATX 24-pin power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.

You may use the 20-pin ATX power supply as you like. If you'd like to use the 20-pin ATX power supply, please plug your power supply along with pin 1 & pin 13 (refer to the image at the right hand).
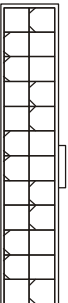

pin 13

pin 12
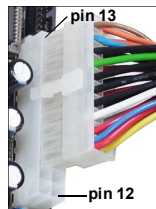
Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWROK	20	Res
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

ATX1

ATX 12V Power Connector: JPW1

This 12V power connector is used to provide power to the CPU.

Pin Definition

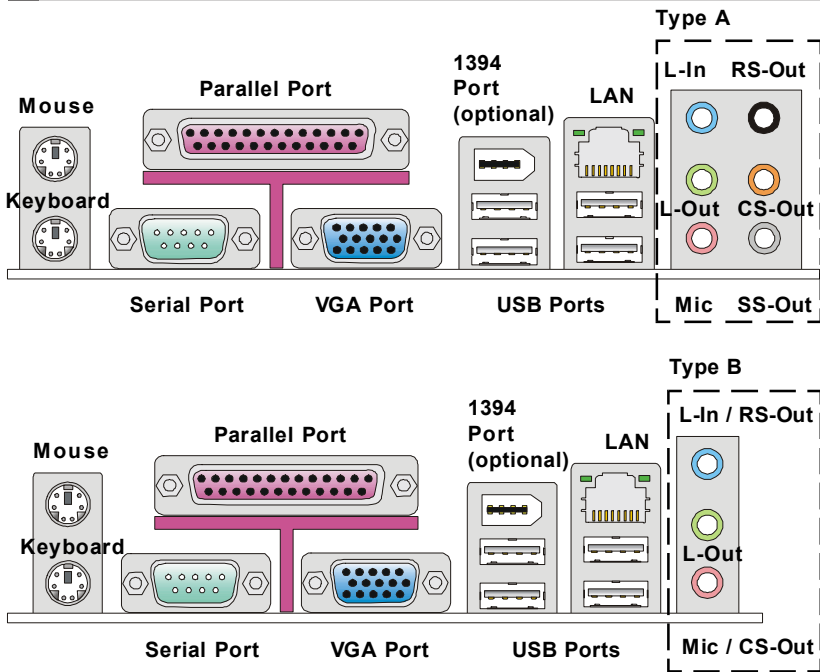| PIN	SIGNAL
1	GND
2	GND
3	12V
4	12V

JPW1

Important

1. *Make sure that all the connectors are connected to proper ATX power supplies to ensure stable operation of the mainboard.*
2. *Power supply of 350 watts (and above) is highly recommended for system stability.*
3. *ATX 12V power connection should be greater than 18A.*

Back Panel

Type A

Mouse

Parallel Port

1394 Port (optional)

LAN

L-In   RS-Out

Keyboard

L-Out   CS-Out

Serial Port   VGA Port   USB Ports   Mic   SS-Out

Type B

Mouse

Parallel Port

1394 Port (optional)

LAN

L-In / RS-Out

Keyboard

L-Out

Serial Port   VGA Port   USB Ports   Mic / CS-Out

▶ **Mouse/Keyboard**
The standard PS/2® mouse/keyboard DIN connector is for a PS/2® mouse/keyboard.

▶ **Parallel Port**
A parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

▶ **Serial Port**
The serial port is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector.

▶ **VGA Port**
The DB15-pin female connector is provided for monitor.

▶ **1394 Port (optional)**
The IEEE1394 port on the back panel provides connection to IEEE1394 devices.

▶ **USB Port**
The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

► **LAN**

The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.

Activity Indicator ———— Link Indicator
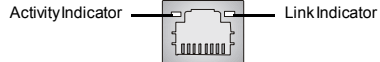
LED	Color	LED State	Condition
Left	Orange	Off	LAN link is not established.
		On (steady state)	LAN link is established.
		On (brighter & pulsing)	The computer is communicating with another computer on the LAN.
Right	Green	Off	10 Mbit/sec data rate is selected.
		On	100 Mbit/sec data rate is selected.
	Orange	On	1000 Mbit/sec data rate is selected.

► **Audio Ports (Type A)**

These audio connectors are used for audio devices. You can differentiate the color of the audio jacks for different audio sound effects.

- **Line-In (Blue)** - Line In is used for external CD player, tapeplayer or other audio devices.
- **Line-Out (Green)** - Line Out, is a connector for speakers or headphones.
- **Mic (Pink)** - Mic, is a connector for microphones.
- **RS-Out (Black)** - Rear-Surround Out in 4/ 5.1/ 7.1 channel mode.
- **CS-Out (Orange)** - Center/ Subwoofer Out in 5.1/ 7.1 channel mode.
- **SS-Out (Gray)** - Side-Surround Out 7.1 channel mode.

► **Audio Ports (Type B)**

These audio connectors are used for audio devices. You can differentiate the color of the audio jacks for different audio sound effects.

- **Line-In / RS-Out (Blue)** - Line In is used for external CD player, tapeplayer or other audio devices. Rear-Surround Out in 4/ 5.1/7.1 channel mode.
- **Line-Out (Green)** - Line Out, is a connector for speakers or headphones.
- **Mic / CS-Out (Pink)** - Mic, is a connector for microphones. Center/ Subwoofer Out in 5.1/7.1 channel mode.
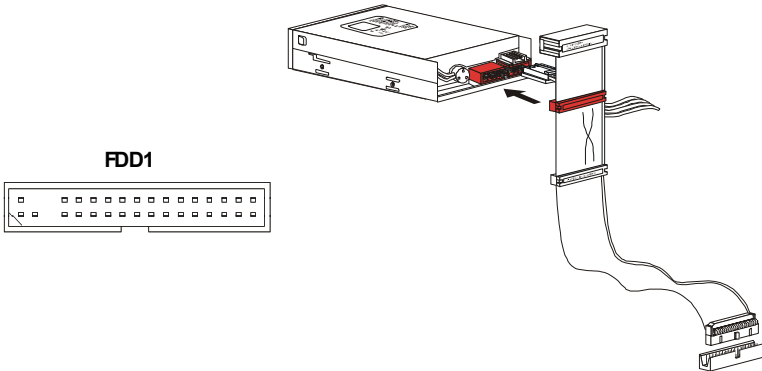
Important

To reach the 8-channel sound effect, the 7th and 8th channels (Side-Surround Out) must to output from front panel (pinheader) if you purchase the mainboard with 3 audio jacks.
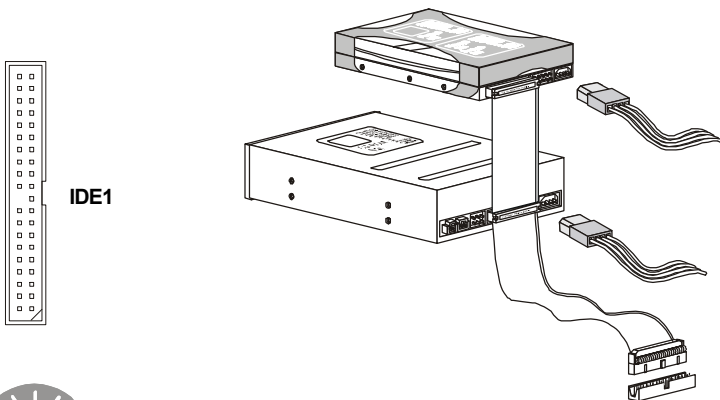
Connectors

Floppy Disk Drive Connector: FDD1

This connector supports 360KB, 720KB, 1.2MB, 1.44MB or 2.88MB floppy disk drive.

FDD1

IDE Connector: IDE1

This connector supports IDE hard disk drives, optical disk drives and other IDE devices.

IDE1

Important

If you install two IDE devices on the same cable, you must configure the drives separately to master / slave mode by setting jumpers. Refer to IDE device's documentation supplied by the vendors for jumper setting instructions.

Serial ATA Connector: SATA1 ~ SATA4

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.

SATA4 SATA3
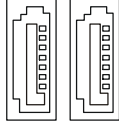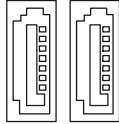
SATA2   SATA1

supported by ICH7/ICH7R(optional)
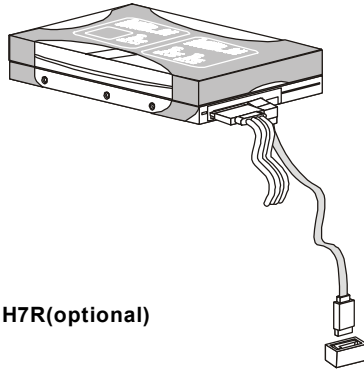
> **Important**
>
> *Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during transmission.*

Fan Power Connectors: CPUFAN1, SYSFAN1~2
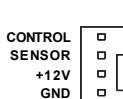
The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

CONTROL
SENSOR
+12V
GND

CPUFAN1

GND
+12V
SENSOR

SYSFAN1

GND
+12V
SENSOR
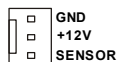
SYSFAN2

Important

1. *Please refer to the recommended CPU fans at processor's official website or consult the vendors for proper CPU cooling fan.*
2. *CPUFAN1 / SYSFAN1 / SYSFAN2 supports fan control. You can adjust fan speed in **H/W Monitor** menu of BIOS and install **Dual Core Center** utility that will automatically control the CPU fan speed according to the actual CPU temperature.*
3. *Fan cooler set with 3 or 4 pins power connector are both available for CPUFAN.*

Chassis Intrusion Connector: JCI1

This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.

CINTRU ☐ ☐ GND
    1 2
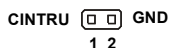
JCI1

IEEE1394 Connector: J1394_1 (optional)
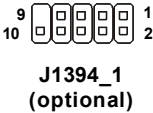
This connector allows you to connect the IEEE1394 device via an optional IEEE1394 bracket.

Pin Definition

9
10 〔□□□□□〕 **1**
2

**J1394_1
(optional)**

PIN	SIGNAL	PIN	SIGNAL
1	TPA+	2	TPA-
3	Ground	4	Ground
5	TPB+	6	TPB-
7	Cable power	8	Cable power
9	Key (no pin)	10	Ground

IEEE1394 Bracket (Optional)
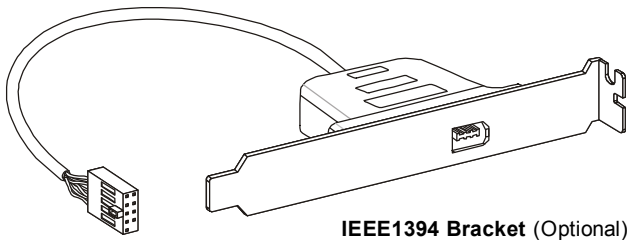
S/PDIF-Out Connector: JSPD1

This connector is used to connect S/PDIF (Sony & Philips Digital Interconnect Format) interface for digital audio transmission.

JSPD1

GND
SPDIF
VCC
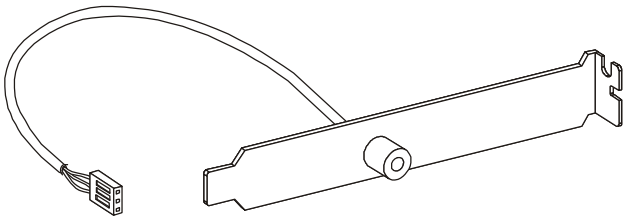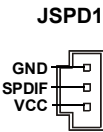
S/PDIF Bracket (Optional)

Front Panel Connectors: JFP1, JFP2

These connectors are for electrical connection to the front panel switches and LEDs. The JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.

JFP2

JFP1

Speaker | Power LED

Power Switch | Reset Switch
Power LED | HDD LED

JFP1 Pin Definition

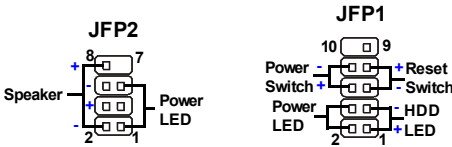| PIN	SIGNAL	DESCRIPTION
1	HD_LED +	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED -	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW -	Reset Switch low reference pull-down to GND
6	PWR_SW +	Power Switch high reference pull-up
7	RST_SW +	Reset Switch high reference pull-up
8	PWR_SW-	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.

JFP2 Pin Definition

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	SPK-	Speaker-
3	SLED	Suspend LED
4	BUZ+	Buzzer+
5	PLED	Power LED
6	BUZ-	Buzzer-
7	NC	No connection
8	SPK+	Speaker+

CD-In Connector: CD_IN1

This connector is provided for external audio input.

CD_IN1

L   GND   R
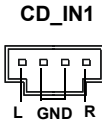
Front Panel Audio Connector: JAUD1

This connector allows you to connect the front panel audio and is compliant with Intel® Front Panel I/O Connectivity Design Guide.
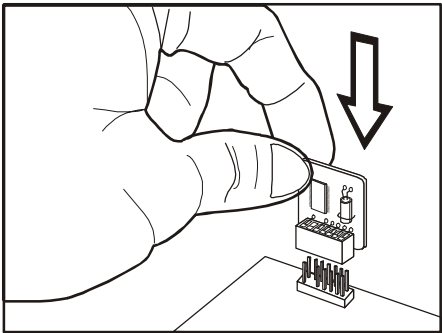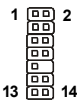
$$\begin{matrix} 2 \\ 1 \end{matrix} \boxed{\begin{matrix} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \square & \cdot \end{matrix}} \begin{matrix} 10 \\ 9 \end{matrix}$$ **JAUD1**

HD Audio Pin Definition

PIN	SIGNAL	DESCRIPTION
1	MIC_L	Microphone - Left channel
2	GND	Ground
3	MIC_R	Microphone - Right channel
4	PRESENCE#	Active low signal-signals BIOS that a High Definition Audio dongle is connected to the analog header. PRESENCE# = 0 when a High Definition Audio dongle is connected
5	LINE out_R	Analog Port - Right channel
6	MIC_JD	Jack detection return from front panel microphone JACK1
7	Front_JD	Jack detection sense line from the High Definition Audio CODEC jack detection resistor network
8	NC	No control
9	LINE out_L	Analog Port - Left channel
10	LINEout_JD	Jack detection return from front panel JACK2

TPM Module connector: JTPM1(optional)

This connector connects to a TPM (Trusted Platform Module) module (optional). Please refer to the TPM security platform manual for more details and usages.

JTPM1

$$\begin{matrix} 1 \\ \\ \\ \\ 13 \end{matrix} \boxed{\begin{matrix} \square & \square \\ \square & \square \\ \square & \square \\ \square & \square \\ \square & \square \end{matrix}} \begin{matrix} 2 \\ \\ \\ \\ 14 \end{matrix}$$

Pin	Signal	Description	Pin	Signal	Description
1	LCLK	LPC clock	2	3V dual/3V_STB	3V dual or 3V standby power
3	LRST#	LPC reset	4	VCC3	3.3V power
5	LAD0	LPC address & data pin0	6	SIRQ	Serial IRQ
7	LAD1	LPC address & data pin1	8	VCC5	5V power
9	LAD2	LPC address & data pin2	10	KEY	No pin
11	LAD3	LPC address & data pin3	12	GND	Ground
13	LFRAME#	LPC Frame	14	GND	Ground

Front USB Connector: JUSB1 ~ 2

These connectors, compliant with Intel® I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as **USB HDD**, **digital cameras**, **MP3 players**, **printers**, **modems and the like**.
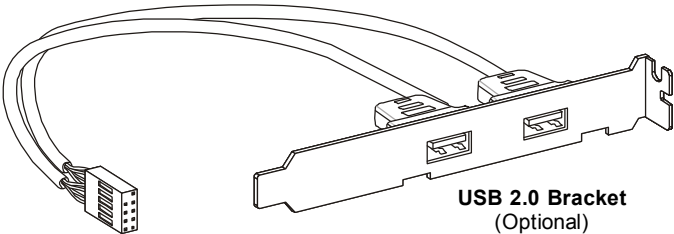
JUSB1~2
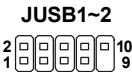
Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key (no pin)	10	USBOC

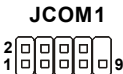**USB 2.0 Bracket**
(Optional)

Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

Serial Port Connector: JCOM 1

This connector is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial device.

JCOM1

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicate

Jumper

Clear CMOS Jumper: JBAT1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can auto-matically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

JBAT1

Keep Data   Clear Data
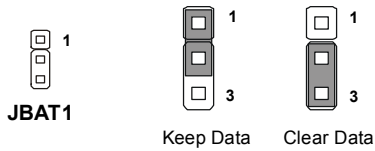
Important

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.
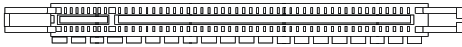
Slots

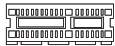## PCI (Peripheral Component Interconnect) Express Slots

The PCI Express slot supports the PCI Express interface expansion card.
The PCI Express x 16 slot supports up to 4.0 GB/s transfer rate.
The PCI Express x 1 slot supports up to 250 MB/s transfer rate.

PCI Express x16 Slot

PCI Express x1 Slot

PCI (Peripheral Component Interconnect) Slots

The PCI slots support LAN cards, SCSI cards, USB cards, and other add-on cards that comply with PCI specifications. At 32 bits and 33 MHz, it yields a throughput rate of 133 MBps.

32-bit PCI Slot

> **Important**
>
> *When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.*

PCI Interrupt Request Routing

The IRQ, acronym of interrupt request line and pronounced I-R-Q, are hardware lines over which devices can send interrupt signals to the microprocessor. The PCI IRQ pins are typically connected to the PCI bus pins as follows:

	Order 1	Order 2	Order 3	Order 4
PCI Slot 1	INT A#	INT B#	INT C#	INT D#
PCI Slot 2	INT B#	INT C#	INT D#	INT A#

Chapter 3
BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.
You may need to run the Setup program when:

² An error message appears on the screen during the system booting up, and requests you to run SETUP.

² You want to change the default settings for customized features.

MSI
MICRO-STAR INTERNATIONAL

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <DEL> key to enter Setup.

Press DEL to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

1. The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

2. Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:

   A7528IMS V1.0 011708 where:

   1st digit refers to BIOS maker as A = AMI, W = AWARD, and P = PHOENIX.
   2nd - 5th digit refers to the model number.
   6th digit refers to the chipset as I = Intel, N = nVidia, and V = VIA.
   7th - 8th digit refers to the customer as MS = all standard customers.
   V1.0 refers to the BIOS version.
   011708 refers to the date this BIOS was released.

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F6>	Load Optimized Defaults
<F8>	Load Fail-Safe Defaults
<F10>	Save all the CMOS changes and exit

Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and

▶ Primary IDE Master
▶ Primary IDE Slave
▶ Secondary IDE Master
▶ Secondary IDE Slave

press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

The Main Menu

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.

  ▶ Standard CMOS Features        ▶ Cell Menu

  ▶ Advanced BIOS Features          Load Fail-Safe Defaults

  ▶ Integrated Peripherals          Load Optimized Defaults

  ▶ Power Management Setup          Save & Exit Setup

  ▶ H/W Monitor                     Exit Without Saving

    BIOS Setting Password


  ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
         F8:Fail-Safe Defaults    F6:Optimized Defaults

        Configure Time and Date.  Display System Information...

        v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```

► Standard CMOS Features
Use this menu for basic system configurations, such as time, date etc.

► Advanced BIOS Features
Use this menu to setup the items of AMI® special enhanced features.

► Integrated Peripherals
Use this menu to specify your settings for integrated peripherals.

► Power Management Setup
Use this menu to specify your settings for power management.

►H/W Monitor
This entry shows your PC health status.

► BIOS Setting Password
Use this menu to set the password for BIOS.

► Cell Menu
Use this menu to specify your settings for frequency/voltage control and overclocking.

► Load Fail-Safe Defaults
Use this menu to load the default values set by the BIOS vendor for stable system performance.

▶ Load Optimized Defaults
Use this menu to load the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard.
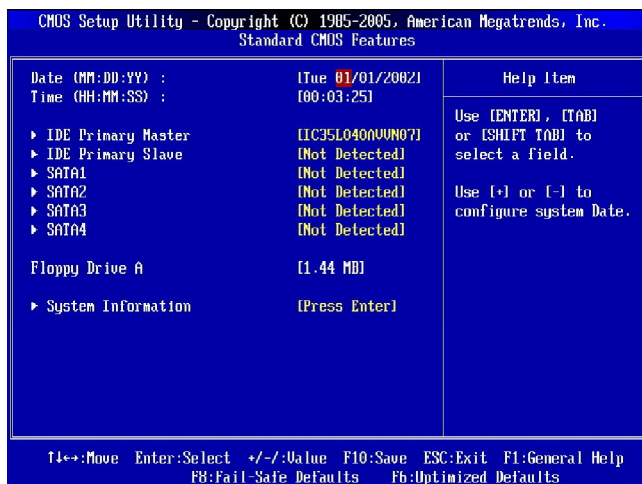
▶ Save & Exit Setup
Save changes to CMOS and exit setup.

▶ Exit Without Saving
Abandon all changes and exit setup.

Standard CMOS Features

The items in Standard CMOS Features Menu includes some basic setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

```
        CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                                Standard CMOS Features

    Date (MM:DD:YY) :           [Tue 01/01/2002]          Help Item
    Time (HH:MM:SS) :           [00:03:25]

  ▶ IDE Primary Master         [IC35L040AVVN07]      Use [ENTER], [TAB]
  ▶ IDE Primary Slave          [Not Detected]        or [SHIFT TAB] to
  ▶ SATA1                      [Not Detected]        select a field.
  ▶ SATA2                      [Not Detected]
  ▶ SATA3                      [Not Detected]        Use [+] or [-] to
  ▶ SATA4                      [Not Detected]        configure system Date.

    Floppy Drive A             [1.44 MB]

  ▶ System Information         [Press Enter]


     ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
                  F8:Fail-Safe Defaults    F6:Optimized Defaults
```

▶ **Date (MM:DD:YY)**
This allows you to set the system to the date that you want (usually the current date). The format is <day><month> <date> <year>.

day	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
month	The month from Jan. through Dec.
date	The date from 1 to 31 can be keyed by numeric function keys.
year	The year can be adjusted by users.

▶ **Time (HH:MM:SS)**
This allows you to set the system time that you want (usually the current time). The time format is <hour> <minute> <second>.

▶ **IDE Primary Master/ Slave, SATA 1/2/3/4 Channel**
Press <Enter> to enter the sub-menu, and the following screen appears.

► **Device / Vender / Size**
It will showing the device information that you connected to the SATA connector.

► **LBA/Large Mode**
This allows you to enable or disable the LBA Mode. Setting to Auto enables LBA mode if the device supports it and the devices is not already formatted with LBA mode disabled.

► **DMA Mode**
Select DMA Mode.

► **Hard Disk S.M.A.R.T.**
This allows you to activate the S.M.A.R.T. (Self-Monitoring Analysis & Reporting Technology) capability for the hard disks. S.M.A.R.T is a utility that monitors your disk status to predict hard disk failure. This gives you an opportunity to move data from a hard disk that is going to fail to a safe place before the hard disk becomes offline.

Important

Primary IDE Master/ Slave, Serial-ATA 1/2/3/4 Channel are appearing when you connect the HD devices to the IDE/ SATA connector on the mainboard.

► **Floppy A**
This item allows you to set the type of floppy drives installed. Available options: [None], [360K, 5.25 in.], [1.2M, 5.25 in.], [720K, 3.5 in.], [1.44M, 3.5 in.], [2.88M, 3.5 in.].

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► System Information

Press <Enter> to enter the sub-menu, and the following screen appears.


```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                           System Information

  Intel(R) Pentium(R) Dual  CPU  E2160  @ 1.80GHz        Help Item
  CPUID/MicroCode  06FD/A1
  CPU Frequency    1.80GHz (200x9)
  BIOS Version     V1.0B9 01162008
  Physical Memory  1024MB
  Cache Size       1024 KB




  ↑↓←→:Move   Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
                 F8:Fail-Safe Defaults    F6:Optimized Defaults
```

This sub-menu shows the CPU information, BIOS version and memory status of your system (read only).

Advanced BIOS Features
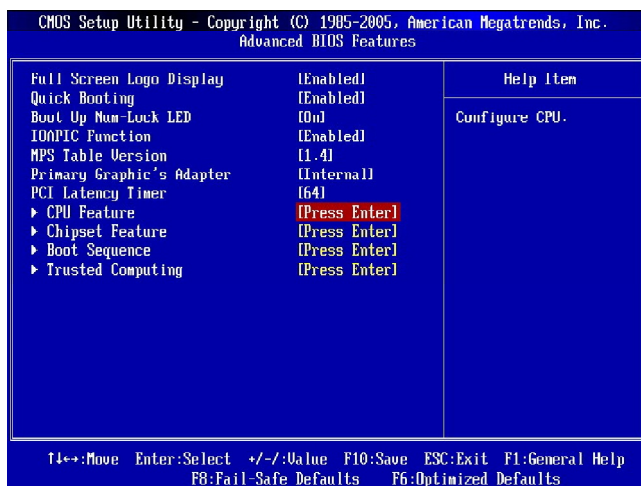
► **Full Screen LOGO Display**

This item enables you to show the company logo on the bootup screen. Settings are:

      [Enabled]   Shows a still image (logo) on the full screen at boot.

      [Disabled]   Shows the POST messages at boot.

► **Quick Booting**

Setting the item to [Enabled] allows the system to boot within 10 seconds since it will skip some check items.

► **Boot Up Num-Lock LED**

This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.

► **IOAPIC Function**

This field is used to enable or disable the APIC (Advanced Programmable Interrupt Controller). Due to compliance with PC2001 design guide, the system is able to run in APIC mode. Enabling APIC mode will expand available IRQ resources for the system.

► **MPS Table Version**

This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system.

► **Primary Graphics Adapter**

This setting specifies which graphic card is your primary graphics adapter.

▶ **PCI Latency Timer**

This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values.

▶ **CPU Feature**

Press <Enter> to enter the sub-menu:

▶ **Execute Disable Bit**

Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

▶ **Set Limit CPUID MaxVal to 3**

The Max CPUID Value Limit is designed to limit the listed speed of the processor to older operating systems.

▶ **Chipset Feature**

Press <Enter> to enter the sub-menu:

▶ **HPET**

The HPET (High Precision Event Timers) is a component that is part of the chipset. You can to enable it, and will provide you with the means to get to it via the various ACPI methods.

▶ **VGA Share Memory Size**

The system shares memory to the onboard VGA card. This setting controls the exact memory size shared to the VGA card.

▶ **DVMT Mode Select**

This item allows you to set the mode for the graphics core..
   [Fixed] mode, a fixed-size fragment of the system memory is allocated to the graphics core. It can only be used by the graphics core.
   [DVMT] mode, the driver of the graphics core uses the system memory like any other OS component or application does.

▶ **DVMT/FIXED Memory**

Specify the size of DVMT memory to allocate for video memory.

▶ **Boot Sequence**

Press <Enter> to enter the sub-menu:

▶ **1st/ 2nd/ 3rd/ 4th Boot Device**

The items allow you to set the first/ second/ third boot device where BIOS attempts to load the disk operating system.

► **Boot From Other Device**
Setting the option to [Yes] allows the system to try to boot from other device. if the system fails to boot from the 1st/ 2nd boot device.

► **Trusted Computing**
Press <Enter> to enter the sub-menu:

► **TCG/TPM SUPPORT**
This setting allows you to enable/disable the TCG/TPM.

► **Excute TPM Command**
This item allows you to enable or disable the TPM security chip.

► **Clearing the TPM**
This item allows you to clear the user information saved in the TPM security chip. When you press <Enter>, a warning message will appear to ask if you want to clear the user information in the security chip. Use the left / right arrow key to select between [OK] and [Cancel], then press <Enter> to confirm your choice.

► **TPM Enable/Disable Status**
This item is not configurable.

► **TPM Owner Status**
This item is not configurable.

Integrated Peripherals
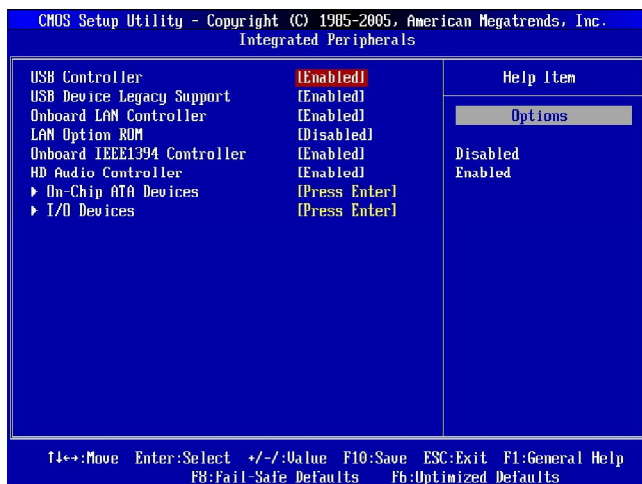
▶ **USB Controller**
This setting allows you to enable/disable the onboard USB controller.

▶ **USB Device Legacy Support**
Select [Enabled] if you need to use a USB-interfaced device in the operating system.

▶ **Onboard LAN Controller**
This item is used to enable/disable the onboard LAN controller.

▶ **LAN Option ROM**
This item is used to decide whether to invoke the Boot ROM of the LAN controller.

▶ **Onboard IEEE1394 Controller**
This item allows you to enable/disable the onboard IEEE1394 controller.

▶ **Audio Controller**
This setting is used to enable/disable the onboard audio controller.

▶ **On-Chip ATA Devices**
Press <Enter> to enter the sub-menu:

  ▶ **On-Chip IDE Controller**
  These items allow users to enable or disable the IDE controller.

  ▶ **PCI IDE BusMaster**
  This item allows you to enable/ disable BIOS to used PCI busmastering for reading/ writing to IDE drives.

▶ **On-Chip SATA Controller**
These items allow users to enable or disable the SATA controller.

▶ **RAID Mode**
This item is used to enable/disable the RAID function for SATA devices.

▶ **I/O Device Configuration**
Press <Enter> to enter the sub-menu:

▶ **COM Port 1/2**
Select an address and corresponding interrupt for the first serial port.

▶ **Parallel Port**
There is a built-in parallel port on the on-board Super I/O chipset that provides Standard, ECP, and EPP features. It has the following options:

[Disabled]
[3BC]   Line Printer port 0
[278]   Line Printer port 2
[378]   Line Printer port 1

▶ **Parallel Port Mode**
This item allows you to select the parallel port mode.

Power Management Setup

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                        Power Management Setup

ACPI Function              [Enabled]            Help Item
ACPI Standby State         [S1]
Power Button Function      [Power Off]      Enable / Disable
Restore On AC Power Loss   [Off]            ACPI support for
▶ Wake Up Event Setup      [Press Enter]    Operating System.

                                            ENABLE: If OS
                                            supports ACPI.

                                            DISABLE: If OS
                                            does not support
                                            ACPI.



   ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
              F8:Fail-Safe Defaults    F6:Optimized Defaults
```

Important

S3-related functions described in this section are available only when your BIOS supports S3 sleep mode.

▶ **ACPI Function**

This item is to activate the ACPI (Advanced Configuration and Power Management Interface) Function. If your operating system is ACPI-aware, such as Windows 2000/ XP, select [Enabled].

▶ **ACPI Standby State**

This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, such as Windows 2000/ XP , you can choose to enter the Standby mode in S1(POS) or S3(STR) fashion through the setting of this field. Settings are:

> [S1]   The S1 sleep mode is a low power state. In this state, no system context is lost (CPU or chipset) and hardware maintains all system context.

> [S3]   The S3 sleep mode is a lower power state where the in formation of system configuration and open applications/files is saved to main memory that remains powered while most other hardware components turn off to save energy. The information stored in memory will be used to restore the system when a "wake up" event occurs.

▶ Power Button Function
This feature sets the function of the power button. Settings are:

[On/ Off] The power button functions as normal power off button.
[Suspend] When you press the power button, the computer enters the suspend/sleep mode, but if the button is pressed for more than four seconds, the computer is turned off.

▶ Restore On AC Power Loss
This item specifies whether your system will reboot after a power failure or interrupt occurs. Settings are:

[Off] Always leaves the computer in the power off state.
[On] Always leaves the computer in the power on state.
[Last State] Restores the system to the status before power failure or interrupt occurred.

▶ Wakeup Event Setup
Press <Enter> and the following sub-menu appears.

▶ Resume From S3 By USB Device
The item allows the activity of the USB device to wake up the system from S3 (Suspend to RAM) sleep state.

▶ Resume From S3 By PS/2 Keyboard
This setting determines whether the system will be awakened from what power saving modes when input signal of the PS/2 keyboard is detected.

▶ Resume From S3 By PS/2 Mouse
This setting determines whether the system will be awakened from what power saving modes when input signal of the PS/2 mouse is detected.

▶ Resume by PCI Device (PME#)
When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PME (Power Management Event).

▶ Resume by PCI-E Device
When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PCIE device.

▶ Resume by RTC Alarm
The field is used to enable or disable the feature of booting up the system on a scheduled time/date.

H/W Monitor

```
CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                            H/W Monitor

  Chassis Intrusion            [Disabled]          Help Item
  CPU Smart Fan Target         [Disabled]
                                               Chassis Intrusion func
          ----- PC Health Status -----

  CPU Temperature              42°C/107°F
  System Temperature           28°C/82°F
  CPU FAN Speed                2581 RPM
  SYS FAN 1 Speed              0 RPM
  SYS FAN 2 Speed              0 RPM
  CPU Vcore                    1.376 V
  3.3V                         3.424 V
  5V                           5.087 V
  12V                          12.320 V




  ↑↓←→:Move  Enter:Select  +/-/:Value  F10:Save  ESC:Exit  F1:General Help
              F8:Fail-Safe Defaults    F6:Optimized Defaults
```

► **Chassis Intrusion**
The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened. To clear the warning message, set the field to [Reset]. The setting of the field will automatically return to [Enabled] later.

► **CPU Smart FAN Target**
The mainboard provides the Smart Fan function which can control the CPU fan speed automatically depending on the current temperature to keep it with in a specific range. You can select a fan target value here. If the current CPU fan temperature reaches to the target value, the smart fan function will be activated. It provides several sections to speed up for cooling down automaticlly.

► **PC Health Status**
   ► **CPU/ System Temperature, CPU FAN/ SYS FAN1/ SYS FAN2 Speed, CPU Vcore, 3.3V, 5V, 12V**
   These items display the current status of all of the monitored hardware devices/ components such as CPU voltage, temperatures and all fans' speeds.

Cell Menu

Important

Change these settings only if you are familiar with the chipset.

▶ **Current CPU / DRAM Frequency**
These items show the current clocks of CPU and Memory speed. Read-only.

▶ **Intel EIST**
The Enhanced Intel SpeedStep technology allows you to set the performance level of the microprocessor whether the computer is running on battery or AC power. This field will appear after you installed the CPU which support speedstep technology.

▶ **Adjust CPU FSB Frequency**
This item allows you to set the CPU FSB frequency (in MHz).

▶ **Adjusted CPU Frequency**
It shows the adjusted CPU frequency (FSB x Ratio). Read-only.

▶ **Advance DRAM Configuration**
Press <Enter> to enter the sub-menu.

   ▶ **DRAM Timing Mode**
   Setting to [Enabled] enables DRAM CAS# Latency automatically to be determined by BIOS based on the configurations on the SPD (Serial Presence Detect) EEPROM on the DRAM module.

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▶ **CAS Latency(CL)**
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. This controls the CAS latency, which determines the timing delay (in clock cycles) before SDRAM starts a read command after receiving it.

Advance DRAM Configuration -> tRCD
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. When DRAM is refreshed, both rows and columns are addressed separately. This setup item allows you to determine the timing of the transition from RAS (row address strobe) to CAS (column address strobe). The less the clock cycles, the faster the DRAM performance.

Advance DRAM Configuration -> tRP
When the **DRAM Timing Mode** sets to [Manual], this field is adjustable. This setting controls the number of cycles for Row Address Strobe (RAS) to be allowed to precharge. If insufficient time is allowed for the RAS to accumulate its charge before DRAM refresh, refresh may be incomplete and DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system.

Advance DRAM Configuration -> tRAS
When the **DRAM Timing Mode** sets to [Manual], this setting determines the time RAS takes to read from and write to a memory cell.

Advance DRAM Configuration -> tRTP
When the **DRAM Timing Mode** sets to [Manual], this setting controls the time interval between a read and a precharge command.

Advance DRAM Configuration -> tRC
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. The row cycle time determines the minimum number of clock cycles a memory row takes to complete a full cycle, from row activation up to the precharging of the active row.

Advance DRAM Configuration -> tWR
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. It specifies the amount of delay (in clock cycles) that must elapse after the completion of a valid write operation, before an active bank can be precharged. This delay is required to guarantee that data in the write buffers can be written to the memory cells before precharge occurs.

Advance DRAM Configuration -> tRRD
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. Specifies the active-to-active delay of different banks.

Advance DRAM Configuration -> tWTR
When the **DRAM Timing Mode** sets to [Manual], the field is adjustable. This item controls the Write Data In to Read Command Delay memory timing. This

constitutes the minimum number of clock cycles that must occur between the last valid write operation and the next read command to the same internal bank of the DDR device.

▶ **Power User Mode**
Press <Enter> to enter the sub-menu.

   ▶ **ADJUST CHANNEL 0/1 DRIVE**
   These two Groups are used to program RCOMP buffer strengths and slew rate table for the various signal groups of MCH. Each channel contains seven groups of signal (GROUP 0 ~ GROUP 6)

   ▶ **ADJUST ODT Strength**
   This feature is designed to improve the signal integrity of the memory channel. ODT(On-Die termination) allows a DRAM to adjust the termination resistance for each DQ and DQS/DQS# signal.

   ▶ **ADJUST SCOMP Strength**
   SCOMP (Secure Communications Processor) hardware protections against DMA devices that allow it to move the corresponding device drivers from the base layer to less critical parts of the system.

▶ **FSB/Memory Ratio**
This item will allow you to adjust the FSB/Ratio of the memory.

▶ **Adjusted DRAM Frequency**
It shows the adjusted DDR Memory frequency. Read-only.

▶ **Adjust PCI-E Frequency(MHz)**
This field allows you to select the PCIE frequency (in MHz).

▶ **Auto Disable DIMM/PCI Frequency**
When set to [Enabled], the system will remove (turn off) clocks from empty DIMM and PCI slots to minimize the electromagnetic interference (EMI).

▶ **Spread Spectrum**
When the motherboard's clock generator pulses, the extreme values (spikes) of the pulses create EMI (Electromagnetic Interference). The Spread Spectrum function reduces the EMI generated by modulating the pulses so that the spikes of the pulses are reduced to flatter curves. If you do not have any EMI problem, leave the setting at Disabled for optimal system stability and performance. But if you are plagued by EMI, set to Enabled for EMI reduction. Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clock speed which may just cause your overclocked processor to lock up.

Important

1. If you do not have any EMI problem, leave the setting at [Disabled] for optimal system stability and performance. But if you are plagued by EMI, select the value of Spread Spectrum for EMI reduction.
2. The greater the Spread Spectrum value is, the greater the EMI is reduced, and the system will become less stable. For the most suitable Spread Spectrum value, please consult your local EMI regulation.
3. Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clock speed which may just cause your overclocked processor to lock up.

Load Fail-Safe/ Optimized Defaults

The two options on the main menu allow users to restore all of the BIOS settings to the default Fail-Safe or Optimized values. The Optimized Defaults are the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard. The Fail-Safe Defaults are the default values set by the BIOS vendor for stable system performance.

When you select Load Fail-Safe Defaults, a message as below appears:

Pressing *Y* loads the BIOS default values for the most stable, minimal system performance.

When you select Load Optimized Defaults, a message as below appears:

Pressing *Y* loads the default factory settings for optimal system performance.

BIOS Setting Password

When you select this function, a message as below will appear on the screen:

Enter New Password

Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.
To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password.
When a password has been set, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Appendix A
Dual Core Center

Dual CoreCenter, the most useful and powerful utility that MSI has spent much research and efforts to develop, helps users to monitor or configure the hardware status of MSI Mainboard & MSI Graphics card in windows, such as CPU/GPU clock, voltage, fan speed and temperature.

Before you install the Dual CoreCenter, please make sure the system has meet the following requirements:

1. Intel Pentium4 / Celeron, AMD Athlon XP/ Sempron or compatible CPU with PCI Express slot.
2. 256MB system memory.
3. CD-ROM drive for software installation.
4. Operation system: Windows XP.
5. DotNet Frame Work 2.0

MSI
MICRO-STAR INTERNATIONAL

Activating Dual Core Center

Once you have your Dual Core Center installed (locate the setup source file in the setup CD accompanying with your mainboard, path: **Utility --> MSI Utility --> Dual Core Center**), it will have an icon ![icon] in the system tray, a short cut icon on the desktop, and a short cut path in your "Start-up" menu. You may double-click on each icon to enable Dual Core Center.

short-cut icon in the system tray
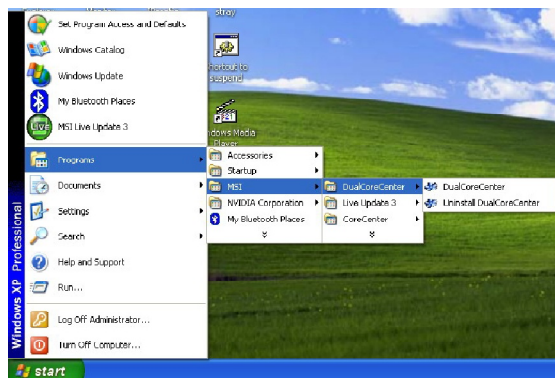
short-cut path in the start-up menu
(path: Start-->Programs-->MSI-->
DualCoreCenter-->DualCoreCenter)

Main

Before using this utility, we have to remind you: only when installing the MSI V044 (V044 has to install with the version 8.26 or newer driver)/ V046 or V060 graphics card can activate the full function of this utility. If you install a graphics card of other brand, only hardware status of the MSI mainboard would be available.

Introduction:

Click each button appearing above to enter sub-menu to make further configuration or to execute the function.

> ### *MB*
> Click MB button to read current CPU temperature, FSB and CPU clock of mainboard will show below.
>
> ### *VGA*
> Click VGA button to read current GPU temperature, GPU clock and memory clock of graphics card will show below.
>
> ### *DOT*
> Click DOT button to enable or disable the Dynamic Overclocking Technology.

AV/ Game/ Office/ Silence/ Cool

MSI provides five common settings for different environments. The settings had been set to optimal values to reach better performance in each environment. Click the button you need.

Important

Before clicking the AV/ Game/ Office/ Silence or Cool button, select Smooth mode or Sharp mode to decide whether you want the system to reach the optimal values smoothly or quickly.

Sharp mode ———— ———— *Smooth mode*

Clock

In this sub-menu, you can adjust and monitor the clocks of MB and graphics card.

Voltage

In this sub-menu, you can adjust and monitor the voltages of MB and graphics card.

FAN Speed

In this sub-menu, you can adjust and monitor the fan speeds of MB and graphics card.

Temperature

In this sub-menu, you can monitor the temperatures of MB and graphics card.

User Profile

In this sub-menu, you can set the values of clock, voltage and fan speed by your need and save them in a profile. You can save 3 profiles for further use.

Important

Click on the icon *, the clock, voltage, fan, and temperature buttons will appear beside the icon.*

DOT (Dynamic OverClocking)

Dynamic Overclocking Technology is an automatic overclocking function, included in the MSI™'s newly developed Dual CoreCenter Technology. It is designed to detect the loading of CPU/ GPU while running programs, and to over-clock automatically. When the motherboard detects that the loading of CPU is exceed the default threshold for a time, it will speed up the CPU and fan automatically to make the system run smoother and faster. When the graphics card detects that the loading of GPU is exceed the default threshold for a time, it will speed up the GPU, memory, fan and voltage automatically to make the system run smoother and faster. When the CPU/ GPU is temporarily suspending or staying in low loading balance, it will restore the default settings instead. Usually the Dynamic Overclocking Technology will be powered only when users' PC runs huge amount of data, like 3D games or video process, and the motherboard/ graphicd card need to be boosted up to enhance the overall performance. There will be several selections when you click the DOT rate button (include increase rate and decrease rate buttons), to select the DOT level, then you have to click the DOT button to apply the DOT function.

DOT FSB-UP Rate button

DOT FSB-DOWN Rate button
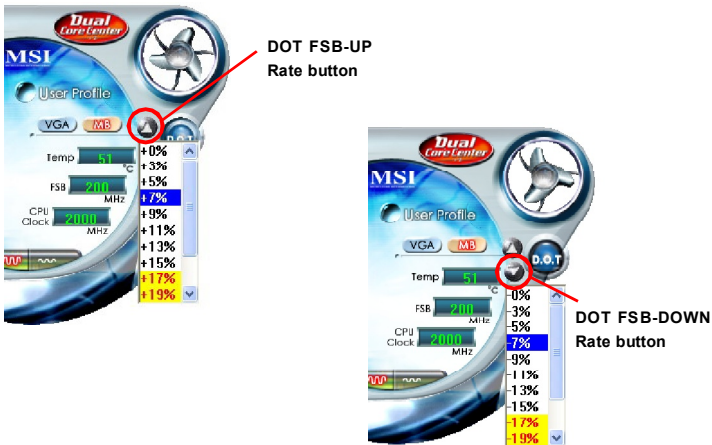
Important

Even though the Dynamic Overclocking Technology is more stable than manual overclocking, basically, it is still risky. We suggest user to make sure that your CPU can afford to overclock regularly first. If you find the PC appears to be unstable or reboot incidentally, it's better to lower the level of overclocking options. By the way, if you need to conduct overclocking manually, please do not to apply the DOT function.

Clock

In the **Clock** sub-menu, you can see clock status (including FSB/ CPU clock of mainboard and GPU/ memory clock of graphics card) of your system. And you can select desired value for overclocking. There will be several items for you to select for overclocking after you click ▼ button. You can click the plus sign button ⊕ to increase the clock, or click the minus sign button ⊖ to decrease the clock. And finally, click the Apply button to apply the values adjusted. If you do not want to apply the adjustments, click the Cancel button to cancel. Or click the Default button to restore the default values.
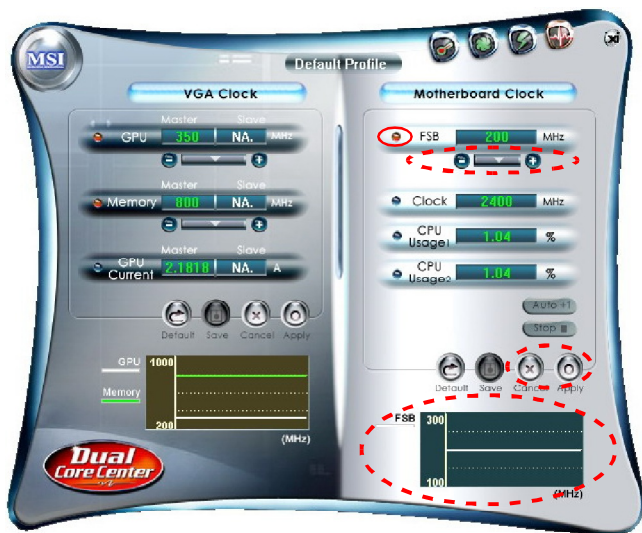
On the underside, it shows the graphs of the clocks. Only the curves of the item which the button is lit up with red color will be shown.

Important

*In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

Voltage

In the **Voltage** sub-menu, you can see voltage status (including Vcore, memory, GPU voltage... etc.) of your system, and you can select desired value for overclocking. It will show several items to select for overclocking after you click the [   ] button. You can click the plus sign button ⊕ to increase the voltage, or click the minus sign button ⊖ to decrease. And finally, click the Apply button to apply the adjustments. If you do not want to apply the adjustments, click the Cancel button to cancel. Or click the Default button to restore the default values.

On the underside, it shows the graphs of the voltages. Only the curves of the item which the button is lit up with red color will be shown.

Important

*In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

FAN Speed

In the **FAN Speed** sub-menu, you can read fan status of your system. Select higher speed for better cooling effect. There are several sections for you to change the fan speed to a section after clicking [⬇] button. Click the plus sign button [+] to increase the fan speed to a section, or click the minus sign button [-] to decrease. Or click the Default button to restore the default values.
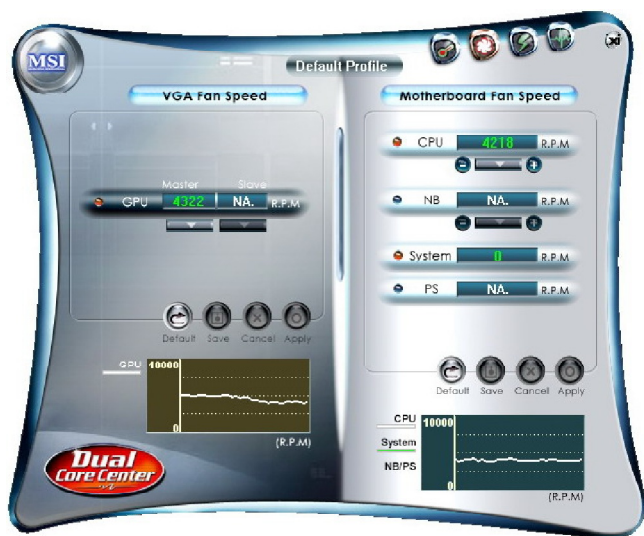
On the underside, it shows the graphs of the fan speed. Only the curves of the item which the button is lit up with red color will be shown.

Important

1. When you set the fan speed manually, please make sure to disabled the "CPU Smart FAN Target" item in the BIOS.
*2. In the user profile, clicking the **Save** button can save the changes to it. In the default profile, the Save button is not available.*

Temperature

In the **Temperature** sub-menu, you can see temperature status of your system.
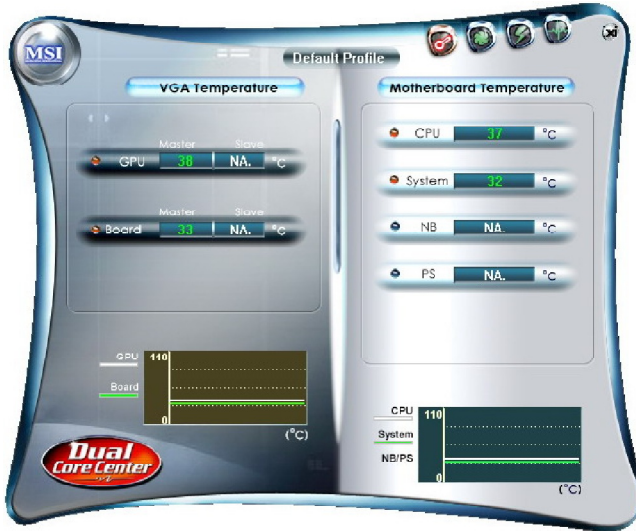
On the underside, it shows the graphs of the temperatures. Only the curves of the item which the button is lit up with red color will be shown.

User Profile

In the **User Profile** sub-menu, click the setting button that besides the user profile bar, and the next screen will appear.

Here you can define the clock/ fan speed/ voltage by your need, click the [▼] button to choose a value quickly, or click the plus [+] / minus sign [−] button to increase/ decrease the value.

Use the draw bar to set the max system temperature. When the system temperature exceeds the threshold you defined, the system will pop up a warning message and shut down the system.
Use the draw bar to set the minimal fan speed. When the fan speed is lower than the threshold you defined, the system will pop up a warning message.

After setting all values you need, you can change the user profile name in the box then click the save button [icon] to save all changes in a profile.
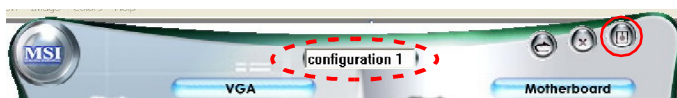
Finally, you can choose the user profile by click the button in the left side and click the Apply button to load the user profile.
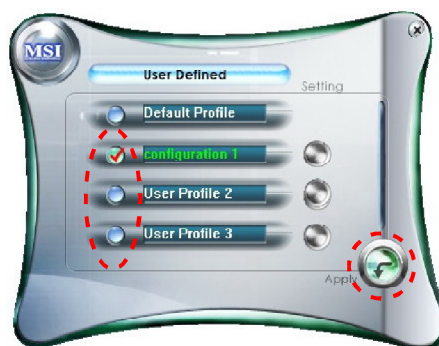
Appendix B
Intel ICH7R SATA RAID

The ICH7R provides a hybrid solution that combines four independent SATAII ports for support of up to four Serial ATAII (Serial ATAII RAID) drives.

It offers RAID level 0 (Striping), RAID level 1 (Mirroring and Duplexing), RAID level 5 (Block Interleaved Distributed Parity), RAID level 10 (A Stripe of Mirrors) and Intel® Martix Storage Technology.

MSI
MICRO-STAR INTERNATIONAL

ICH7R Introduction

The ICH7R provides a hybrid solution that combines four independent SATAII ports for support of up to four Serial ATAII (Serial ATAII RAID) drives.

Serial ATAII (SATAII) is the latest generation of the ATA interface. SATA hard drives deliver blistering transfer speeds up to 300MB/sec. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC. The most outstanding features are:

1. Supports 300MB/s transfers with CRC error checking.
2. Supports Hot-plug-n-play feature.
3. Data handling optimizations including tagged command queuing, elevator seek and packet chain command.

Intel® ICH7R offers RAID level 0 (Striping), RAID level 1 (Mirroring and Duplexing), RAID level 5 (Block Interleaved Distributed Parity), RAID level 10 (A Stripe of Mirrors) and Intel® Martix Storage Technology.

RAID 0 breaks the data into blocks which are written to separate hard drives. Spreading the hard drive I/O load across independent channels greatly improves I/O performance. RAID 1 provides data redundancy by mirroring data between the hard drives and provides enhanced read performance. RAID 5 Provides data striping at the byte level and also stripe error correction information. This results in excellent performance and good fault tolerance. Level 5 is one of the most popular implementations of RAID. RAID 10 Not one of the original RAID levels, multiple RAID 1 mirrors are created, and a RAID 0 stripe is created over these. Intel Matrix RAID Technology is the advanced ability for two RAID volumes to share the combined space of two hard drives being used in unison.

Important

The least number of hard drives for RAID 0, RAID 1 or Matrix mode is 2. The least number of hard drives for RAID 10 mode is 4. And the maximum number of hard drives for RAID 5 mode is 3.
All the information/volumes listed in your system might differ from the illustrations in this appendix.

BIOS Configuration

The Intel Matrix Storage Manager Option ROM should be integrated with the system BIOS on all motherboards with a supported Intel chipset. The Intel Matrix Stroage Manager Option ROM is the Intel RAID implementation and provides BIOS and DOS disk services. Please use <Ctrl> + <I> keys to enter the "Intel(R) RAID for Serial ATA" status screen, which should appear early in system boot-up, during the POST (Power-On Self Test). Also, you need to enable the RAID function in BIOS to create, delete and reset RAID volumes.

Using the Intel Matrix Stroage Manager Option ROM

1. Creating, Deleting and Resetting RAID Volumes:
The Serial ATA RAID volume may be configured using the RAID Configuration utility stored within the Intel RAID Option ROM. During the Power-On Self Test (POST), the following message will appear for a few seconds:

Important

The "Driver Model", "Serial #" and "Size" in the following example might be different from your system.

```
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation,  All Rights Reserved.'

 RAID Volumes
 None defined.

 Physical Disks::
 Port Device Model      Serial #             Size    Type/Status(Vol ID)
 0    HDS722580VLSA80   VNRB3EC20549SL       76.7GB  Non-RAID Disk
 1    HDS722580VLSA80   VNRB3EC20559SL       76.7GB  Non-RAID Disk
 2    HDS722580VLSA80   VNRB3EC20569SL       76.7GB  Non-RAID Disk
 3    HDS722580VLSA80   VNRB3EC20579SL       76.7GB  Non-RAID Disk

Press  <CTRL-I>  to enter Configuration Utility..
```

After the above message shows, press <Ctrl> and <I> keys simultaneously to enter the RAID Configuration Utility.

Important

The following procedure is only available with a newly-built system or if you are reinstalling your OS. It should not be used to migrate an existing system to RAID.

After pressing the <Ctrl> and <I> keys simultaneously, the following window will appear:
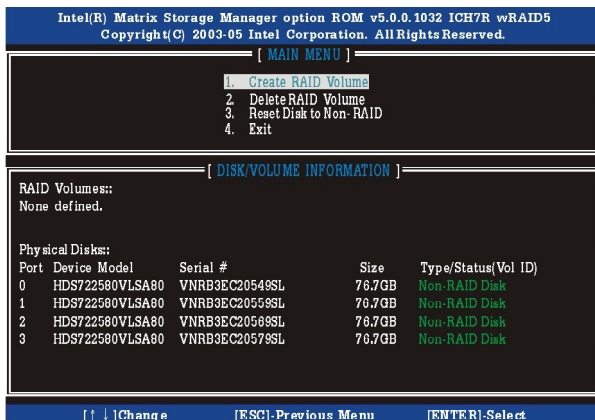

(1) Create RAID Volume

1. Select option 1 "Create RAID Volume" and press <Enter> key. The following screen appears. Then in the **Name** field, specify a RAID Volume name and then press the <TAB> or <Enter> key to go to the next field.
2. Use the arrow keys to select the RAID level best suited to your usage model in **RAID Level**.
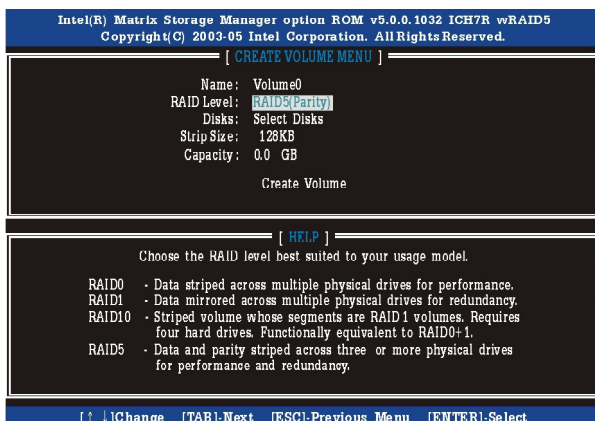
3. In the **Disk** field, press <Enter> key and the following screen appears. Use <Space> key to select the disks you want to create for the RAID volume, then click <Enter> key to finish selection.
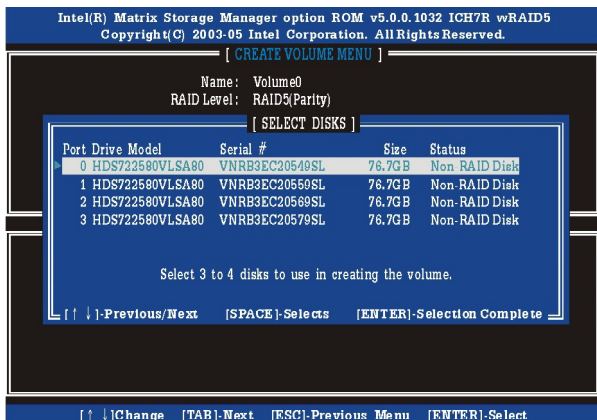
4. Then select the strip value for the RAID array by using the "upper arrow" or "down arrow" keys to scroll through the available values, and pressing the <Enter> key to select and advance to the next field. The available values range from 4KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. Here are some typical values:
    RAID0 – 128KB
    RAID10 – 128KB
    RAID5 – 64KB
5. Then select the capacity of the volume in the **Capacity** field. The default value is the maximum volume capacity of the selected disks.

Important

Since you want to create two volumes (Intel Matrix RAID Technology), this default size (maximum) needs to be reduced. Type in a new size for the first volume. As an example: if you want the first volume to span the first half of the two disks, re-type the size to be half of what is shown by default. The second volume, when created, will automatically span the remainder of two hard drives.

6. Then the following screen appears for you to confirm if you are sure to create the RAID volume. Press <Y> to continue.

```
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
========================= [ CREATE VOLUME MENU ] =========================

                    Name :    Volume0
              RAID Level :    RAID5(Parity)
                   Disks :    Select Disks
              Strip Size :    64KB
                Capacity :    228.0  GB

          ┌─────────────────────────────────────────────────────┐
          │  WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.    │
          │                                                       │
          │  Are you sure you want to create this volume? (Y/N):  │
          └─────────────────────────────────────────────────────┘

                 Press 'ENTER' to Create the specified volume.

============================================================================
      [↑ ↓]Change    [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```

7. Then the following screen appears to indicate that the creation is finished.

```
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
============================= [ MAIN MENU ] =============================
                    1.   Create RAID Volume
                    2.   Delete RAID Volume
                    3.   Reset Disk to Non-RAID
                    4.   Exit

======================= [ DISK/VOLUME INFORMATION ] =======================
RAID Volumes::
ID    Name              Level          Strip    Size     Status      Bootable
0     Volume0           RAID5(Parity)  64KB     228.0GB  Normal      Yes

Physical Disks::
Port  Device Model      Serial #                Size     Type/Status(Vol ID)
0     HDS722580VLSA80   VNRB3EC20549SL          76.7GB   Member Disk(0)
1     HDS722580VLSA80   VNRB3EC20559SL          76.7GB   Member Disk(0)
2     HDS722580VLSA80   VNRB3EC20569SL          76.7GB   Member Disk(0)
3     HDS722580VLSA80   VNRB3EC20579SL          76.7GB   Non-RAID Disk

============================================================================
       [↑ ↓]Change          [ESC]-Previous Menu          [ENTER]-Select
```

(2) Delete RAID Volume

Here you can delete the RAID volume, but please be noted that all data on RAID drives will be lost.

Important

If your system currently boots to RAID and you delete the RAID volume in the Intel RAID Option ROM, your system will become unbootable.

Select option 2 **Delete RAID Volume** from the main menu window and press <Enter> key to select a RAID volume for deletion. Then press <Delete> key to delete the selected RAID volume. The following screen appears.
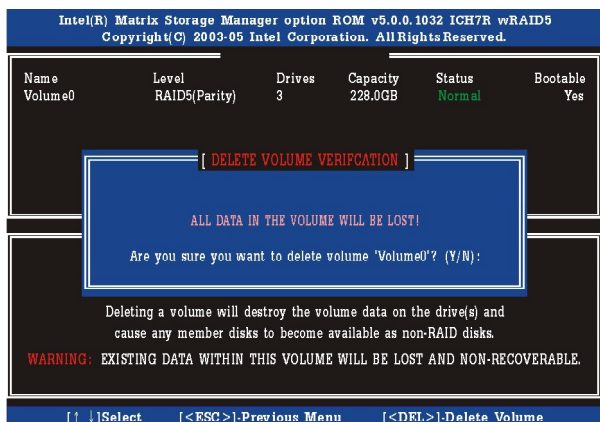
Press <Y> key to accept the volume deletion.

(3) Reset Disks to Non-RAID

Select option 3 **Reset Disks to Non-RAID** and press <Enter> to delete the RAID volume and remove any RAID structures from the drives. The following screen appears:
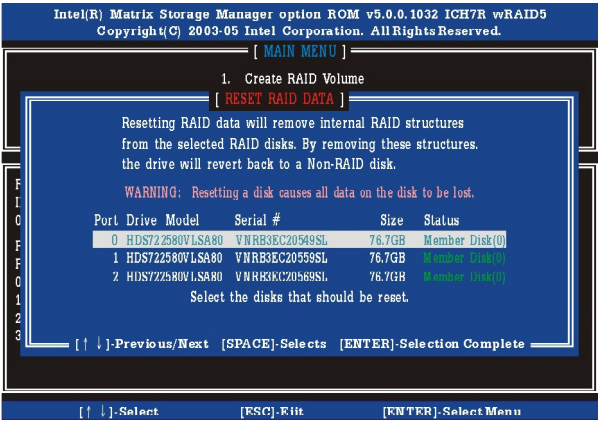
Press <Y> key to accept the selection.

> **Important**
>
> 1. *You will lose all data on the RAID drives and any internal RAID structures when you perform this operation.*
> 2. *Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations or a failed volume or failed disk.*

Installing Software

Install Driver in Windows XP / 2000

† **New Windows XP / 2000 Installation**

The following details the installation of the drivers while installing Windows XP / 2000.

1. Start the installation:
   Boot from the CD-ROM. Press F6 when the message "Press F6 if you need to install third party SCSI or RAID driver" appears.
2. When the Windows XP Setup window is generated, press S to specify an Additional Device(s).
3. Insert the driver diskette *Intel IAA RAID XP Driver For ICH7R (NH82801GR)* into drive A: and press <Enter>.

> **Important**
>
> *Please follow the instruction below to make an "Intel IAA RAID XP Driver For ICH7R (NH82801GR)" for yourself.*
> *1. Insert the MSI CD into the CD-ROM drive.*
> *2. Click the "Browse CD" on the Setup screen.*
> *3. Copy all the contents in the: \\IDE\Intel\ICH7R\Floppy to a formatted floppy disk.*
> *4. The driver disk for ICH7R RAID controller is done.*

4. Choose the driver *Intel(R) 82801GR SATA RAID Controller* from the drop-down list that appears on Windows XP Setup screen, and press the <Enter> key.
5. Press <Enter> to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, press <Enter> to continue with installation.
6. From the Windows XP/2000 Setup screen, press the <Enter> key. Setup will now load all device files and then continue the Windows XP/2000 installation.

† **Existing Windows XP/2000 Driver Installation**

1. Insert the MSI CD into the CD-ROM drive.
2. The CD will auto-run and the setup screen will appear.
3. Under the Driver tab, click on *Intel IAA RAID Edition*.
4. The drivers will be automatically installed.

† **Confirming Windows XP/2000 Driver Installation**

1. From Windows XP/2000, open the **Control Panel** from **My Computer** followed by the System icon.
2. Choose the **Hardware** tab, then click the **Device Manager** tab.
3. Click the "**+**" in front of the **SCSI and RAID Controllers** hardware type. The driver *Intel(R) NH82801GR SATAII RAID Controller* should appear.

Installation of Intel Matrix Storage Console

The Intel Application Accelerator RAID Edition driver may be used to operate the hard drive from which the system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system after installation; however, you will have the ability to un-install all other non-driver components.

Insert the MSI CD and click on the **Intel IAA RAID Edition** to install the software.
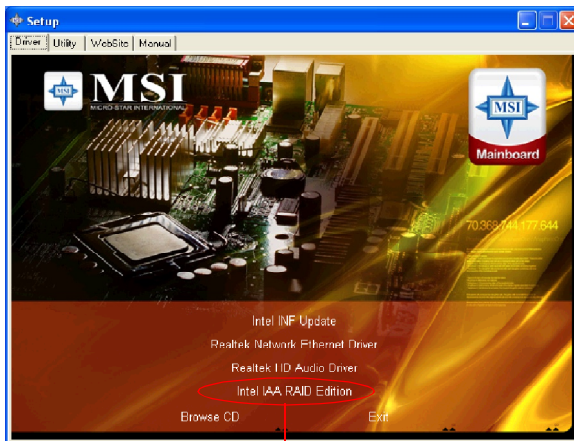
Click on this item

The **InstallShield Wizard** will begin automatically for installation showed as following:

Click on the **Next** button to proceed the installation in the welcoming window.
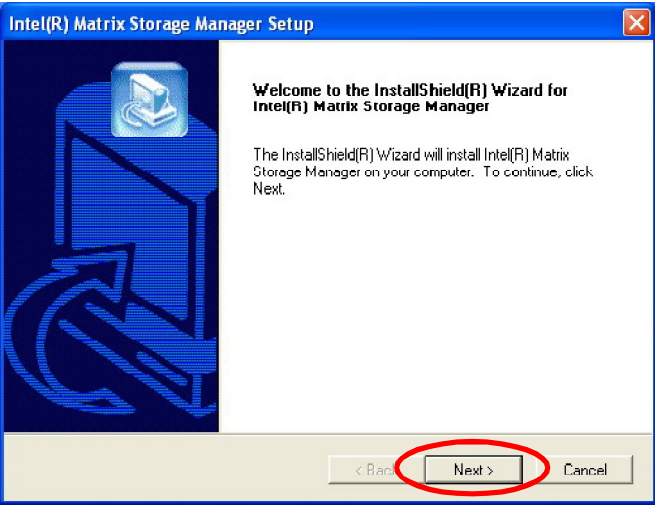
The window shows the components to be installed. Click **Next** button to continue.
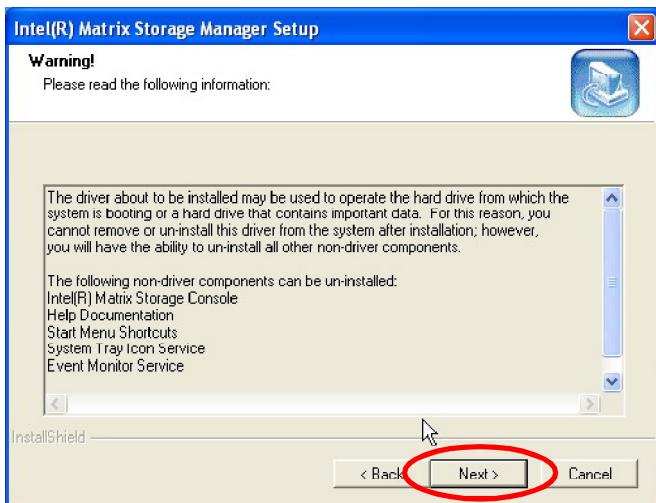
After reading the license agreement in the following window, click **Yes** button to continue.
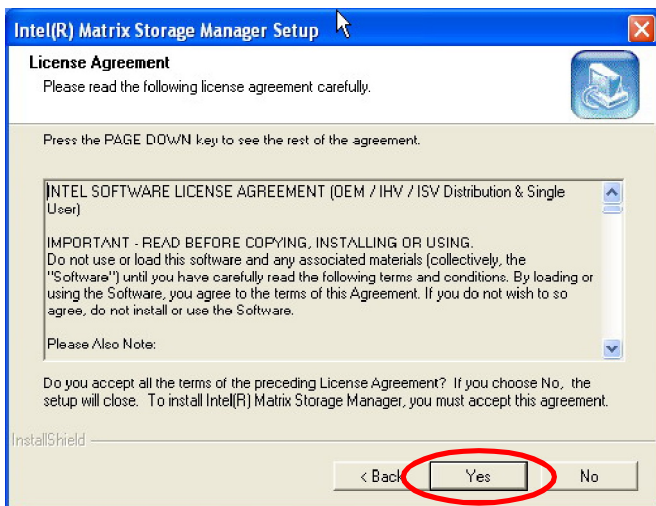
Select the folder in which you want the program to be installed in the following window, and click **Next** button to start installation.
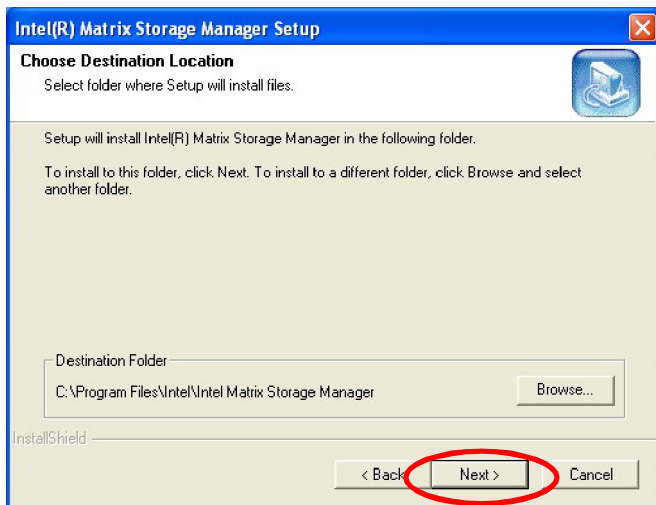
Select a program folder in the following window where you want Setup to add the program icon.
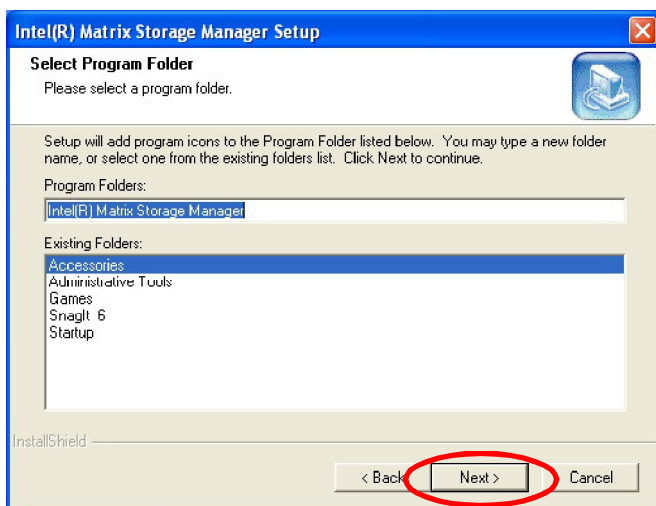
The following window appears to show the Intel Application Accelerator RAID Edition Setup installation status.
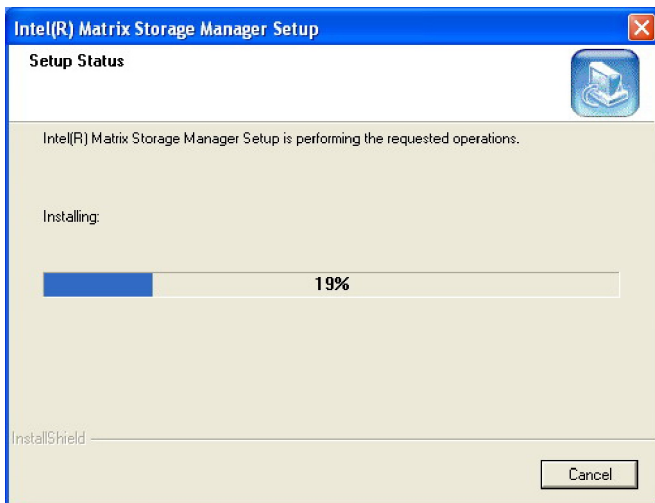
Once the installation is complete, the following window appears.
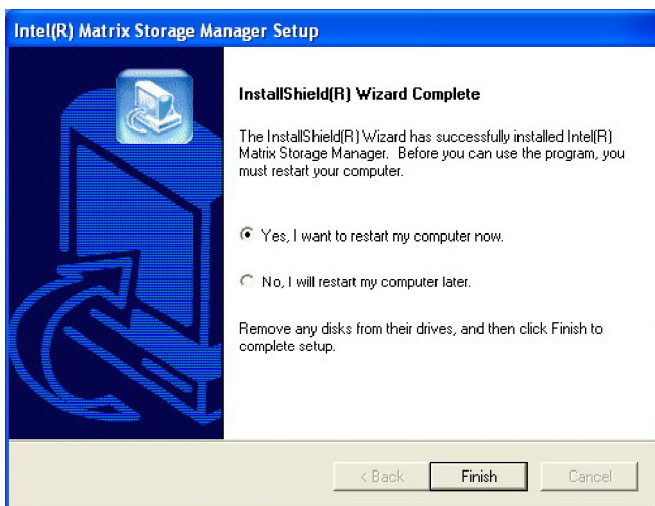
RAID Migration Instructions

The Intel Matrix Storage Console offers the flexibility to upgrade from a single Serial ATA (SATA) hard drive to RAID configuration when an additional SATA hard drive is added to the system. This process will create a new RAID volume from an existing disk. However, several important steps must be followed at the time the system is first configured in order to take advantage of RAID when upgrading to a second SATA hard drive:

1. BIOS must be configured for RAID before installing Windows XP on the single SATA hard drive. Refer to **On Chip SATA Setting** for properly setting of the BIOS.
2. Install the Intel Application Accelerator RAID Driver during Windows Setup. Refer to **Installing Software** for instructions on installing the driver during Windows Setup.
3. Install the Intel Matrix Storage Console after the operating system is installed.

To create a volume from an existing disk, complete the following steps:

Important

*A **Create from Existing Disk** operation will delete all existing data from the added disk and the data cannot be recovered. It is critical to backup all important data on the added disk before proceeding. However, during the migration process, the data on the source disk is preserved.*

After the Intel Matrix Storage Console has been successfully installed and the system has rebooted, click on the Intel Application Accelerator shortcut link (**Start --> All Programs --> Intel Matrix Storage Manager --> Intel Matrix Storage Console**) and the following window will appear:
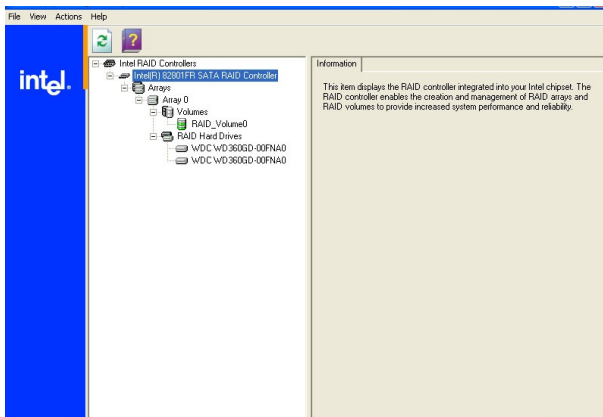
Create RAID Volume from Existing Disk

To create a RAID volume from an existing disk, choose **Action --> Create RAID Volume from Existing Hard Drive**.
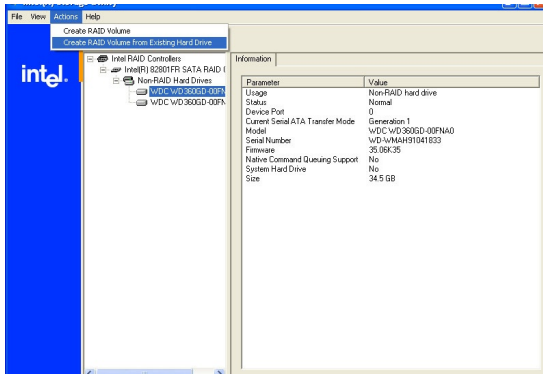
The **Create RAID Volume from Existing Hard Drive Wizard** pops up to lead you for the following procedure. Click **Next** to continue.
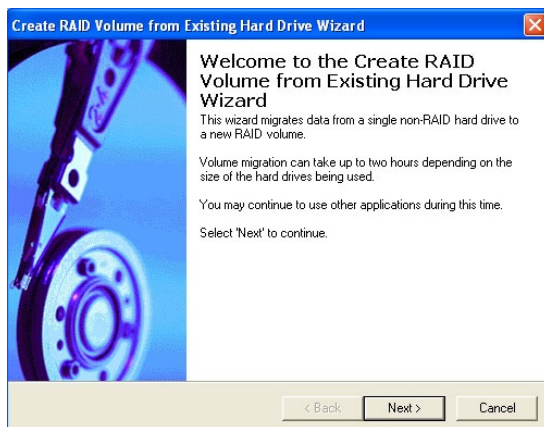
(1) Step 1: Configure Volume

Here you can configure the new RAID volume by entering the volume name, selecting the RAID level and strip size.
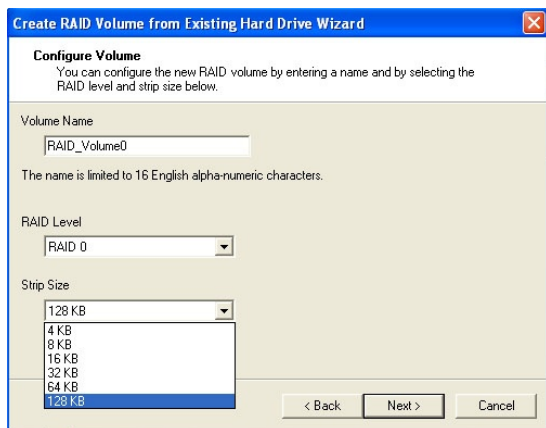
† **RAID Volume Name:**

A desired RAID volume name needs to be typed in where the 'RAID_Volume1' text currently appears above. The RAID volume name has a maximum limit of 16 characters. The RAID volume name must also be in English alphanumeric ASCII characters.

† **RAID Level:**

Select the desired RAID level:

RAID 0 (Performance) – A volume optimized for performance will allow you to access your data more quickly.

RAID 1 (Redundancy) – A volume optimized for data redundancy will provide you with a realtime duplicate copy of your data. Note: Only half of the available volume space will be available for data storage.

RAID 5 (Useful) – RAID 5 can be used on three or more disks, with zero or more spare-disks. The resulting RAID-5 device size will be (N-1)*S, where N is the how many drive, S is the size of the smallest drive in the array. If one of the disks fail, all data are still intact. It can rebuild the disk from the parity information. If spare disks are available, re-construction will begin immediately after the device failure. If two disks fail simultaneously, all data are lost. RAID-5 can survive one disk failure, but not two or more. Both read and write performance usually increase, but can be hard to predict how much. Reads are similar to RAID-0 reads, writes can be either rather

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> expensive (requiring read-in prior to write, in order to be able to calculate the correct parity information), or similar to RAID-1 writes. The write efficiency depends heavily on the amount of memory in the machine, and the usage pattern of the array. Heavily scattered writes are bound to be more expensive.

RAID 10 (Mirrored Stripes) – A RAID 1 array of two RAID 0 arrays.

† **Strip Sizes:**

Select the desired strip size setting. As indicated, the optimal setting is 128KB. Selecting any other option may result in performance degradation. Even though 128KB is the recommended setting for most users, you should choose the strip size value which is best suited to your specific RAID usage model. The most typical strip size settings are:

4KB: For specialized usage models requiring 4KB strips

8KB: For specialized usage models requiring 8KB strips

16KB: Best for sequential transfers

32KB: Good for sequential transfers

64KB: Good general purpose strip size

128KB: Best performance for most desktops and workstations

(2) Select the source disk

Then select the source disk that you wish to use and then click **"--->"** to move it to the **Selected** field. Then click **Next** to continue.

It is very important to note which disk is the source disk (the one containing all of the information to be migrated) and which one is the target disk. On a RAID Ready system, this can be determined by making a note during POST of which port (e.g. Port 0 or Port 1) the single disk is attached to.

You can also use the Intel Application Accelerator RAID Edition utility before the second disk is installed to verify the Port and serial number of the drive that contains all the data.
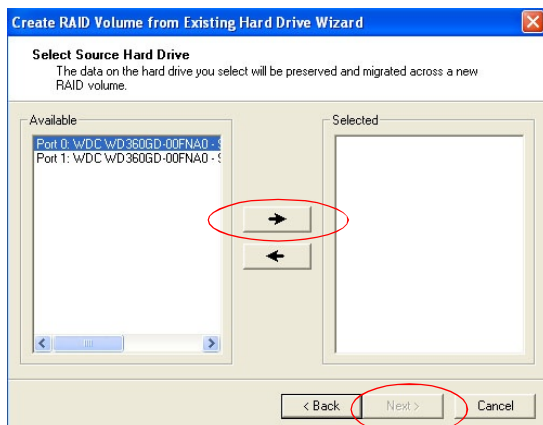
(3) Select Member Hard Drive(s)
Then select the member disk (the target disk) that you wish to use and then click **"---->"** to move it to the **Selected** field. Then click **Next** to continue.
Please note that the existing data on the selected hard drive(s) will be deleted permanently. Do not forget to back up all the important data before continuing.
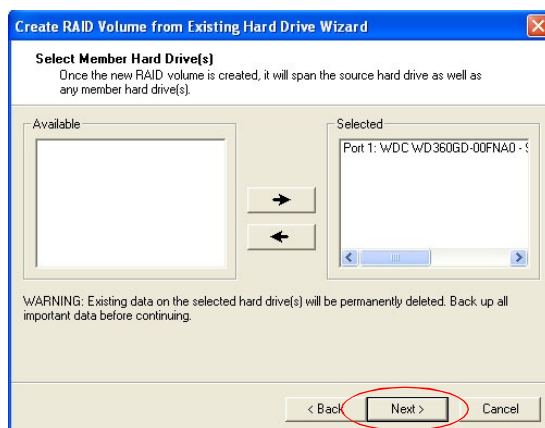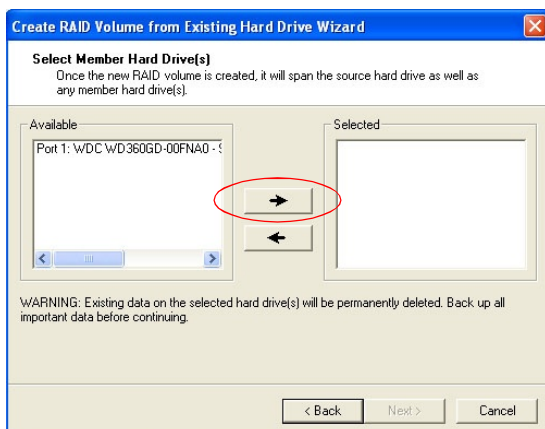
(4) Specify Volume Size
Specify the amount of available array space to be used by the new RAID volume. You may enter the amount in the space or use the slider to specify. It is recommended you use 100% of the available space for the optimized usage. For RAID 0 volume, if you do not specify 100% of the hard drive space, the rest hard drive space will be worked as RAID 1 volume, which is the new technology called Intel Matrix RAID. Then click **Next** to continue.

(5) Start Creating RAID Volume from Existing Hard Drive Wizard
Before you continue the procedure of RAID volume creation from existing hard drive, read the dialogue box below carefully. Please note that once you click **Finish**, the existing data on the selected hard drive(s) will be deleted permanently and this operation cannot be undone. It is critical that you backup all important data before selecting **Finish** to start the migration process.

(6) Start Migration

The migration process may take up to two hours to complete depending on the size of the disks being used and the strip size selected. A dialogue window will appear stating that the migration process may take considerable time to complete, meanwhile a popup dialogue at the taskbar will also show the migration status. While you can still continue using your computer during the migration process, once the migration process starts, it cannot be stopped. If the migration process gets interrupted and your system is rebooted for any reason, it will pick up the migration process where it left off. You will be provided with an estimated completion time (the remaining time will depend on your system) once the migration process starts.
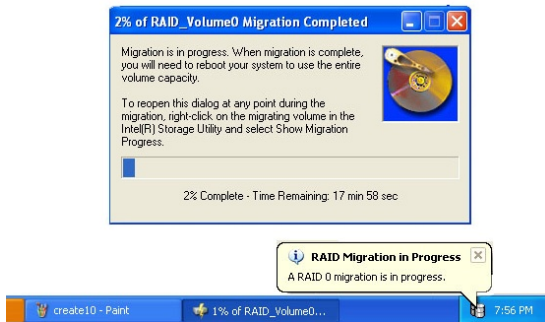
The following screen appears if the migration process is completed successfully. Then you have to reboot your system to use the full capacity of the new volume.
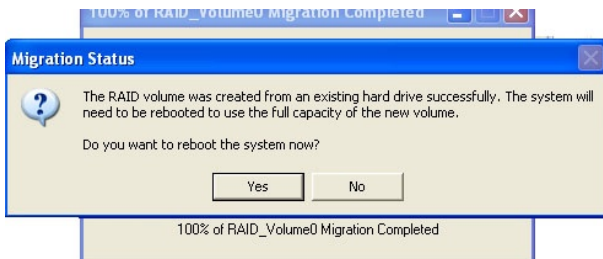
Degraded RAID Array

A RAID 1, RAID 5 or RAID 10 volume is reported as degraded when one of its hard drive members fails or is temporarily disconnected, and data mirroring is lost. As a result, the system can only utilize theremaining functional hard drive member. To re-establish data mirroring and restore data redundancy, refer to the procedure below that corresponds to the current situation.

Missing Hard Drive Member
1. Make sure the system is powered off.
2. Reconnect the hard drive.
3. Reboot the system to Windows; the rebuild will occur automatically.

Failed Hard Drive Member
1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Reboot the system to Intel RAID Option ROM by press <Ctrl> and <I> keys simultaneously during the Power-On Self Test (POST).
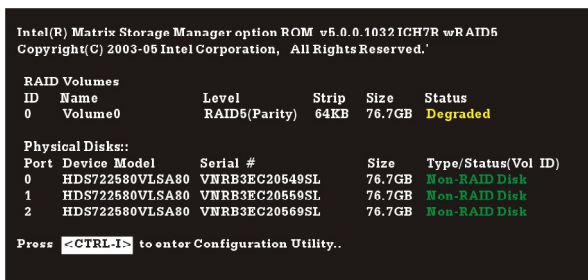
4. Select the port of the destination disk for rebuilding, and then press ENTER.
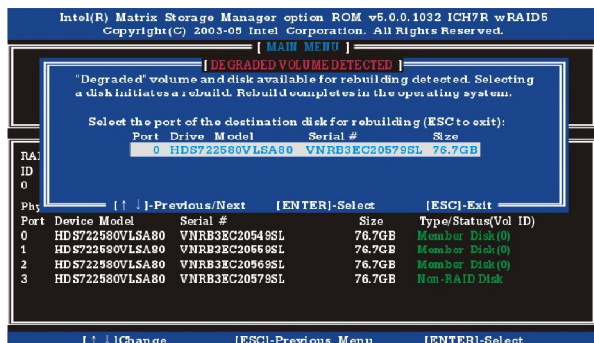
5. Exit Intel RAID Option ROM, and then reboot to Windows system.
6. When prompted to rebuild the RAID volume, click 'Yes'.
7. The Intel(R) Storage Utility will be launched. Right-click the new hard drive and select 'Rebuild to this Disk'. The 'Rebuild Wizard' will be launched which will guide you through the process of rebuilding to the new hard drive.